The
# Electrical Review

VOL. CIX NOVEMBER 27, 1931 No. 2818

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGHEAY, CENT, LONDON." Code, A B C. Telephone No.: Central 5871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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## Domestic Apparatus Trade

PLENTY of evidence is accumulating that the certainty of Britain taking measures for the protection of the industrial interests of her own people is leading foreign manufacturers of a number of leading lines to prepare plans for erecting factories here.

The Home trade in certain special electrical lines, such as vacuum cleaners, refrigerators, and washing machines, has been largely, we may say chiefly, in foreign products. Owners of such works as are already operating here and depending upon their foreign factories for supplying parts, or for supplementing their production of complete appliances, recognise that in future they may have to enlarge their British branches and limit their importation.

By availing themselves of imported products, the consuming public have restricted enterprise on the part of British manufacturers. The latter may now feel encouraged to embark upon schemes which hitherto may not have seemed to be justified.

It is reported that if Great Britain adopts a protectionist policy one well-known works (vacuum cleaners and refrigerators) in England will have to be considerably enlarged, because it will no longer be possible to bring over half-manufactured goods from Sweden. We also hear, on good authority, that an old-established American manufacturer of electrical refrigerators for domestic and commercial purposes is at present making preliminary inquiries with a view to arranging for their manufacture here by a British firm, and for their distribution by a British house having a widespread and up-to-date sales organisation which knows the channels through which the domestic electrical appliance trade is conducted.

It has long been clear that importers have recognised the greatness of the future trade in domestic electrical apparatus in Britain. Now, with the market here likely to be more secure than it has been, our manufacturers should be able to produce in larger quantities and, as one consequence, to meet the ever-increasing demand from the public for a lower-priced article. We say much regarding the importance of cheap electricity, and much about the necessity for giving a good service to the consumer, but the sale of British electrical apparatus might be wonderfully stimulated by a general cheapening movement. We welcome the signs that have lately appeared, and the trade announcements that are now being made, of reductions in British prices. Many foreign products have been sold on this market and in our overseas dominions because of their low price. Who has been selling them is not the question we are concerned with at the moment.

It should be admitted, however, that a study of the complete range of electrical domestic appliances that are being used in the Home and Colonial markets indicates the existence of particular inventions or different designs of familiar articles, developed and produced abroad, that may continue to serve the consumers' interests. It will be for their producers, knowing that our national watchword is "Buy British!" to decide whether they will manufacture here or abroad.

But, while there may always be a market here for the technically or otherwise superior article, especially for the apparatus whose originality and efficiency commend it in spite of a tariffed selling price, we must see to it that in the wide general range of domestic electrical apparatus the market is retained for British factories, and that the latter are enabled effectively to compete in the British Empire and overseas.

**The First Dumping Order**

ON Wednesday, November 25th, the first anti-dumping Order came into force. For the next six months, at any rate, the Board of Trade has authority to impose Customs duties up to 50 per cent. of their value on certain classes of goods in which abnormal importation takes place. These include electrical vacuum cleaners and parts thereof, and wireless sets and various associated or component parts thereof. It is possible that a second Order covering other classes of goods will be issued before these lines appear in print. It is reported that Germany exported nearly 250,000 bicycle tubes to England in October as compared with under 100,000 in September. Who said vacuum cleaner parts? A further statement shows that in the first ten days of November wireless apparatus imports were in excess of those for the whole of October. A Press dispatch from Washington quotes a prominent Senator as stating that the "prohibitive" duties covered by the first Order will have very little effect in the United States, as the bulk of American manufactured goods sold in England are patented articles, "such as telephones and vacuum cleaners." Another report indicates that for a certain non-electrical line included in the Order—typewriters—an American manufacturer is going to meet the new situation by putting up a factory in Canada!

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**Criticism from Canada**

HERE we are led back to domestic appliances by a letter that has reached us from a public official in Canada, who has been feeling around for ways in which he can help us to extend our electrical trade there. What has he to say? This: "From what I have seen of English electrical appliances, I am afraid that the majority of them are likely to be much too expensive for this market." Recent investigations in regard to irons, hotplates, and ranges revealed to him what he calls "a quite remarkable disparity in price." Another criticism offered, and one which some will listen to with little patience, is that he was astounded at the small range of up-to-date lamp standards and other fittings in England to choose from to fit up his own house. We cannot help wishing that he had called at the ELECTRICAL REVIEW offices so that we could have convinced him of the ability of our fittings manufacturers to meet almost any conceivable taste and pocket.

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**Price Again**

THE writer gets on to safer ground when he tells British manufacturers that they never will be able to sell their electrical appliances in Canada by merely sending out catalogues. Our special Commissioner in Canada also wishes us to urge upon manufacturers that nothing but steady, continuous pressure in that market will yield results. "Isolated taps and hammerings here and there will be of little avail." He, too, stresses the matter of price—says that British goods are high, in spite of the fact that for most lines production costs seem to be higher in Canada than in England. All of which naturally leads us back to the argument that, given a larger business at home, the domestic-apparatus maker can increase his production and reduce his costs, and so be the better able to meet the price requirements of the export markets.

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**International Relations**

IT is easy and interesting to ask whither we are tending. Taking a long view with regard to dumping and protective measures, we must remember the increasing tendency of recent years toward international relations in the electrical industry and try to visualise their effects. That such international financial interconnections, patent and other working agreements and understandings, exist between electrical concerns here and in various other great industrial countries of the world, is common knowledge. Neither the parcelling out of export markets nor the proportional arrangement of imports is unfamiliar electrically. The situation in the electrical world is, we should say, as complex as that of any British industry. Unfortunately, while much good has come from united action of some sections, there are other branches where home competition is said to be deplorably wasteful.

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**International Regulation**

Two speeches of the week on these matters call for comment. Mr. Baldwin, at Cleckheaton, said that he had long felt that the problem of many industries would tend to become more international than national. Something would have to be done to try to meet international cutting, "just as we try to meet national cutting." He foresees industries trying to regulate output, first nationally and then internationally. At present every country which indulges in mass production must have a surplus; that surplus floods the earth; then there is no profitable market left.

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**Mr. Fleming's Views**

IT is also the view of Mr. A. P. M. Fleming that the future of the electrical industry must be considered internationally. His reasons are set out to-day in our report of the E.D.A. Conference, and the imagination and outlook of the reader will receive a stimulus from their close consideration. From these we pass rapidly to his suggestion of an *electrical week* in every large town in the country once a year to make the people electrically conscious and up to date in domestic electrical practice. Most admirable! But it would not relieve any single electricity undertaking from its responsibility for doing it always and *doing it now*. Mr. Fleming's title was "Looking Forward." Correspondence reaching us from all directions reveals the growing conviction that a systematic general canvass is long overdue.

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**Electrigas**

IN a recent letter commenting upon the shortcomings of the normal boiling plate in the electric cooker, a correspondent put forward the suggestion that gas rings should supplant them. Another correspondent, in this issue, hails this as a bright and novel idea—but it is still true that there is nothing new under the sun. So long ago as 1922 an American firm produced what it called an "Electrigas" cooker, in which, while the oven and grill were electric, there were fitted five gas burners. The same concern had previously introduced a still more monstrous hybrid—a combined coal and electric range. Since the preliminary trumpets we have heard no more of this invention, which suggests to us that there was a "nigger" in it. Can it be that, after all, the housewife, converted to electric cooking, prefers the electric boiling plate, if it is a little slower, to the gas ring with its objectionable fumes and odour?

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**Street Lighting First**

STREET lighting is a great help in securing load in rural areas. It has been abundantly proved by some of the more progressive supply undertakings that the appearance of some good lamps in a previously poorly lighted or unlighted village has a wonderful advertising effect. Further, the establishment of a public lighting system, particularly with overhead lines, is often more than half way towards the installation of a general distribution scheme. It certainly requires some courage to lay mains and erect pole lines without direct guarantees, but this is the first essential in rural electrification.

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**"Domestic" The Winner**

THE annual report of the Electricity Commissioners reaches our hands at the last moment. It is mentioned on another page to-day, but we wish to single out for reference here the significant fact that once more in a year of industrial depression, with a poorer power load, the aggregate is improved by a 5 per cent. advance in the domestic load.

# Electricity in Healing. By E. P. Cumberbatch, M.A., B.M.

## Recent advances in surgical and medical applications

IN the treatment of disease by electrical methods the most conspicuous advances in recent times have undoubtedly been due to the use of high-frequency currents. The most remarkable, and one which may be regarded as epoch-marking, is the employment of a special type of high-frequency current to serve the purpose of the knife in surgery, especially in the removal of malignant growths. A thin needle is secured to a suitable handle of insulating material and connected, by a flexible cable, with one of the terminals of a high-frequency current generator.

The action of the current in cutting tissue can be strikingly demonstrated by the following method. A block of raw meat is placed on a metal plate connected to one of the generator terminals. This plate constitutes an *indifferent* electrode; the mounted needle is the *active* electrode. The generator is set in operation and adjusted to give nearly its maximum current. The operator grasps the handle of the active electrode and brings the point of the needle to the meat, at which, just before contact is made, a minute arc is struck. The needle is now introduced into the meat, but the arc is not extinguished; it spreads itself out, as it were, around the entering needle and takes the form of a thin film that separates the metal from the meat.

This may be likened to what happens when a metal rod is dipped into a glass of water after flowers of sulphur have been sprinkled on the surface. The rod takes with it a thin film of sulphur that separates the metal from the water, thus enabling it to be withdrawn in a dry state.

When the needle electrode is withdrawn from the meat, the arc is again observed at the moment when the point leaves the surface. If the needle is not withdrawn but moved onwards in the meat, it does not encounter the slightest opposition or resistance in its passage. The film-like arc cuts the meat, and the divided surfaces fall apart.

### Sealing the Capillaries

But the arc does more than cut the meat. It will be observed that the divided surfaces have lost the look of raw meat; they are white or pale in appearance. The advancing arc has actually coagulated the divided surfaces. The needle can be drawn through the meat with considerable rapidity, but, even so, the coagulation will be observed. The depth to which it extends is slightly less than a millimetre.

Living tissue can be divided in the same manner. The coagulation of the divided surfaces has the valuable effect of sealing the minute blood vessels and lymphatics at the moment when they are severed. The arc therefore makes a bloodless cut of the tissues, at any rate, so far as the microscopic vessels are concerned.

When it passes through the walls of the larger vessels there is an escape of blood, but the divided ends can be rapidly sealed in a novel manner which represents another advance in the use of electrical methods in surgery. The bleeding end is picked up by a pressure forceps and nipped between its ends. Instead of passing a ligature around the vessel the active electrode is placed in direct contact with the metal of the forceps, by which means the current now passes through the body.

Meeting the narrow portion of tissue at the end of the forceps it quickly heats it, by reason of its resistance, to a coagulating temperature and seals the vessel. The forceps can then be unclipped and removed. This method is much quicker than the customary procedure of tying the vessel, and the saving of time is important when many vessels have to be ligatured.

It is in the case of the smallest vessels, *viz.*, the capillaries, that the sealing, *at the time of cutting*, is of such importance, as it is along the lymphatic capillaries that cancer cells spread to distant parts. When the surgeon uses the scalpel and cuts through the tissue adjoining a malignant growth, there is always the risk of disseminating any cancer cells which may have spread into the surrounding tissues.

### Absence of Hæmorrhage

The capillaries are not sealed when they are cut by the scalpel, and the sponging of the wound and the application of swabs are likely to spread cancer cells about. When the wound is sutured, these living cells are able to multiply and make their way through the unsealed ends of the lymphatics, but electric current not only seals the vessels but kills any cancer cells on the line of the cut and a little way on each side.

The prevention of bleeding from the minute vessels is a great aid when operations are performed on certain non-malignant tumours of the brain. During these operations there is the risk of hæmorrhage—very difficult to control—when the scalpel is used. The blood constantly oozes away from the cut surfaces through the ends of numberless minute vessels. The use of the arc in place of the scalpel has enabled the operation to be performed with success, as the bleeding occurs only from the larger vessels, which are easily and rapidly sealed in the manner just described.

[*Elliott & Fry*

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An incision made by the arc will heal in the same manner as one made by a scalpel—that is, by primary union—when the divided surfaces are brought into apposition and sutured together. It is necessary, however, that the coagulation of the divided surfaces should not extend more than a slight depth, which appears to vary for different tissues, otherwise the coagulated tissue will not be absorbed, but will separate in the form of a slough, and healing will then be delayed.

The "cutting current" must possess certain characteristics; the oscillation must be sustained, and the maximum voltage attained during the oscillation should not be higher than that necessary to enable the arc to be struck when the point of the needle is almost in contact with the tissue. The amperage is the varying factor; it should be high enough to form an arc that will divide the tissue without at the same time coagulating it to too great a depth, otherwise primary union will not take place.

The most elaborate generator yet constructed provides one current for skin, another for fat, and a third for muscle. It has not yet been decided whether the current should be one of damped or undamped oscillation to provide the best results.

### Diathermic Coagulation

There are two other and different ways of using high-frequency currents for surgical purposes, in which the abnormal tissue is killed *in situ*. In one the tissue is heated through and through until it coagulates *en masse*; this form of treatment is known as "diathermic coagulation." In the other, now known as "electro-desiccation" (formerly as "fulguration") the tissue is deprived of moisture and shrivelled up.

In diathermic coagulation the current is passed through the abnormal tissue and its intensity is gradually increased, causing the tissue to become hotter and hotter until it coagulates as the current overcomes its resistance. The procedure is as follows:—The active electrode—a narrow metal disc or button—is placed in contact with the tissue needing treatment and is connected to one of the terminals of the generator. The circuit is completed by means of a large plate electrode secured to some part of the back or chest.

Suppose that a cancerous growth of the tongue is to be treated, the active electrode is placed in contact with it and the current is gradually increased. Soon the portion of the growth in the vicinity of this electrode whitens from coagulation. Further increase of the current causes the fluid in the coagulated tissue to boil, and steam escapes from under the electrode.

The highest temperature is attained where the density of the current is greatest, *i.e.*, in the tissue in contact with the active electrode. The density becomes rapidly lower as the distance from this electrode increases, until, at a certain depth, it is insufficient to raise the temperature high enough to cause coagulation.

### Treatment of Cancer

The use of high-frequency currents for procuring diathermic coagulation was first practised in this country at St. Bartholomew's Hospital in 1910. For the first few years it was reserved for malignant growths that were too advanced for removal by the scalpel, but it gave such welcome results in the relief

of pain and discomfort, the prolongation of life, and, in some cases, even in the disappearance of the growth for a year or so, that the method has since been employed in the treatment of cancer that formerly would have been excised by the knife.

At the present time radium largely holds the field in the treatment of malignant disease, but even now there are certain types of malignant growth of the skin that are known to resist the action of radium. They are recognised by their appearance under the microscope, and the best treatment is diathermic coagulation.

Until recent times the main difficulty in the coagulation of tissue by diathermy was that of judging the depth below the surface to which the coagulation extended, as it was not under exact control when the active electrode was applied to the surface. More recently, however, a new technique has been devised to overcome this difficulty. The active electrode has the shape of a needle. When it is inserted into tissue, and the current increased, the coagulation begins at the point of the needle and proceeds upwards, around the shaft, until it reaches the surface. It does not extend more than one or two millimetres below the point or around the shaft.

It is possible, therefore, to regulate the depth of coagulation by the length of insertion of the needle, when it penetrates the healthy tissue adjacent to a growth—its point being below the deepest part to which the malignant issue has spread—the current being increased until the coagulation reaches the surface. The needle is withdrawn and reinserted in closely adjacent positions all around the growth, its point, however, being always in the same position as before, *i.e.*, below the deepest part of the growth.

In this way the growth is imprisoned within a barrier of coagulated tissue. The vessels that pass through this barrier are sealed, thereby preventing dissemination of malignant cells when the growth itself is treated or when a portion is removed for the microscope—a procedure which might be highly dangerous if the protective barrier were not present. The growth can then be excised by means of the cutting current.

This combined treatment, *viz.*, the coagulation of the surrounding tissue, and the subsequent removal of the growth by the cutting current, is of value in cases where the abnormal tissue is highly malignant, and the anatomical position does not allow the incisions for removal to be made more than a slight distance from the growth.

### Desiccating Abnormal Tissue

The object of the third method of employing high-frequency currents for surgical purposes is to kill abnormal tissue by drying or desiccating it, "fulguration." The results from the treatment of cancer in this way did not fulfil expectations, and the method fell into abeyance until its value began to be recognised for treating non-malignant growths and other types of abnormal tissue. The technique was improved, and to-day we have a very efficient method of treating various growths of the skin, certain moles, warts, birthmarks, &c. In electro-desiccation the abnormal tissue is killed by directing high-frequency sparks on it.

One way of performing the operation is the following. The patient sits or reclines on a "condenser couch," on the seat of which is a sheet of ebonite covering a smaller sheet of metal connected to one of the generator terminals. The patient grasps a metal rod connected to the other terminal. The generator is then set in action. The operator holds an electrode (which resembles a large mounted needle) and brings its point almost into contact with the growth or tissue, on to which torrents of short thick sparks pass, drying rather than burning it.

By careful adjustment of the apparatus and gradual increase of the length of the sparks the abnormal tissue is reduced to a shrunken dry mass. In this state it can be left to separate spontaneously, or it can be removed with the point of a scalpel. The reaction following the treatment is surprisingly mild, and a soft, smooth, supple scar is left.

### Electro-thermic Surgery

In each of these three types of operation, which may be called the electro-thermic methods of surgery—cutting by the arc, diathermic coagulation, and electro-desiccation—the effects are brought about by the action of heat that is electrically produced, either *in*, *through*, or *on* the tissues. The degree of heat and its distribution differ in each. In the cutting operation the electrical energy is largely expended in producing an intense degree of heat (that of the arc) in a restricted region (around the needle). In diathermic coagulation the heat need not be greater than that required to coagulate the tissue proteins; it is distributed throughout the mass of tissue under treatment.

In electro-desiccation the heat is intense (that of the electric sparks) and it is distributed first on the surface of the tissue under treatment and afterwards on successively deeper layers, each one being dried, pierced by sparks, the next layer dried, and so on.

The same high-frequency current is not equally suitable for all the operations described. In the case of the cutting current the oscillations must be sustained. In the case of the coagulating current the oscillations must be sustained, or nearly sustained, and it must be able to attain a higher amperage than the cutting current. In regard to the desiccating current, the voltage must attain a higher value than is the case with the coagulating current. The current has to pass through an air gap which may be as long as a quarter of an inch or even more. The amperage should not be high, and the oscillations need not be perfectly sustained.

The most suitable frequency of oscillation for each method has not yet been decided. It must be high so that the current may not stimulate the excitable tissues of the body, *viz.*, muscle and nerve. For each electro-thermic method the amperage of the current must be far higher than the maximum that the body could tolerate in the case of direct or low-frequency currents.

### Medical Diathermy

Turning now to the non-surgical uses of high-frequency currents, it may be said that the most recent advances are those made by diathermy. Treatment of disease by degrees of diathermy that are insufficient to harm the tissues (this may be called *medical* diathermy) is no more recent than *surgical* diathermy. Just as the latter was originally reserved for inoperable malignant disease, so was the former first employed for cases of intractable rheumatism and crippling arthritis.

As time went on the value of medical diathermy was gradually established, and in recent times it has been employed with success in the treatment of certain diseases of the eye and ear. It has procured good results in some cases of angina pectoris, and much work has been done in the treatment of lobar pneumonia by its means, but the best and most constant results have been obtained in the treatment of infection of the pelvic organs.

The diathermy current can be passed through the abdominal or pelvic organs by way of electrodes placed on the skin, but these organs cannot be heated by more than a trifling degree when both electrodes are applied to the skin. The skin and underlying fat resist the current much more than the viscera, which are heated but little even when the current is strong enough to raise the temperature of the skin and fat to an unbearable degree. Further, the abundant blood supply of the abdominal and pelvic organs is another disturbing factor, as it brings about the removal of much of the heat by convection.

In the case of the pelvis, however, it is possible to place one of the electrodes in contact with or in close apposition to the organs within, and some of them, or some parts of them, can be heated to the maximum permissible temperature, *viz.*, 114 deg. F. Certain pelvic organs are often the site of chronic infection that is very difficult to remove by the ordinary methods of treatment. By subjecting them to diathermy and obtaining degrees of heat reaching or approaching 114 deg. F. the infection can frequently be obliterated. In the case of the cervix uteri, success is very frequent. Those who are familiar with the problems of medicine will realise what an important achievement this is.

### Treatment of Arthritis

It is established that one type of arthritis is due to the spread of infection, or of toxins, from a primary focus. This infective focus may be in the roots of the teeth or in the tonsils, but the cervix uteri is a common site that has often been overlooked until relatively recent times. If the infection of this focus is removed by diathermy the arthritis will come to an end in most of the cases, and the joints will regain their normal state, always provided the arthritis has not been in existence long enough to cause permanent structural changes in the joints, but even in these long-lasting cases some good may be done by eradicating the infection and applying treatment to the joints. The fire can be extinguished and some repair can be made of the damaged parts.

The current utilised for the production of *medical* diathermy, like that employed for *surgical* diathermy, should be able to attain a relatively high amperage, but for medical diathermy the generator must be much larger because the metal-plate electrodes used in the treatment may have an area of as much as 30 or 40 sq. in. A few machines are now being made with triode valves in place of spark-gaps, and being silent in operation they are particularly suitable for treatment in the wards of hospitals.

The optimum frequency of oscillation of the current has not been finally decided. The frequency seems to influence the distribution of the heat generated in the body. The

matter is very difficult to investigate in such a complex conductor as the body, and the problem is made all the harder by the fact that the *living* tissues are permeated with blood vessels.

As already mentioned, the constantly flowing blood stream tends to remove, by convection, more or less of the heat that is generated in the tissues through which the blood flows.

## Inducing Fever

The most recent advance in medical diathermy has been in the use of high-frequency currents for the elevation of the temperature of the entire body; this is done by applying a large plate electrode to the front of the chest and abdomen and another to the back. The ordinary diathermy current generator is unsuitable for the purpose, and one of special construction, capable of giving a current, under load, of four or five amperes for one, two, three or more hours, is needed. A general temperature as high as 103 deg., 104 deg., or even 105 deg. F. is obtained. In other words an " artificial fever " is produced.

The word " fever " was employed in the old days as the diagnosis of infectious diseases accompanied by rise of temperature. It is much more probable, however, that the rise of temperature represents the effort of nature to get rid of the infection, while the symptoms of the disease are due to the poisons produced by the infecting organisms.

The various methods adopted by the body to get rid of many forms of infection are rendered more potent by heat. The elevation of the temperature of the healthy body, even by three or four degrees, by means of diathermy produces little or no discomfort, while the feeling of exhaustion or weakness that may be noticed when the temperature reaches 104 deg. or 105 deg. F. disappears when it regains its normal value.

## The Value of High Temperature

Certain forms of treatment owe their value to the fact that they bring about a rise of the general temperature. The prolonged immersion of the body in the hot water derived from mineral springs has been employed for generations in the treatment of disease, but the good results were attributed to the salts in the water, not to the elevation of the body temperature. The treatment of infection by the injection of vaccines has now been practised for years, and some workers think that they have specific action—when they are successful—in ridding the body of the same kind or kinds of organisms as those used in the preparation of the vaccines, but doubt has arisen whether specific action of this kind occurs.

There is reason to think that the rise of temperature following the injection of the vaccine is partly, if not wholly, responsible for the results. Success may indeed be obtained when the organisms in the vaccine are not the kind responsible for the disease, when the therapeutic results may reasonably be attributed to the rise of temperature following the injection of the dead organisms that constitute the vaccine.

In recent years a chronic disease of the nervous system, known as general paralysis, and due to infection, has been treated by inducing malaria fever in the patient. Here, again, it was thought that success, when obtained, was due to the inability of the original infecting organisms to survive in the presence of the products of the malaria. Recent evidence seems to prove that it is the high fever accompanying the malaria, and not the malaria itself, that is responsible for the success.

Cases of general paralysis have recently been treated by raising the temperature of the body to 105 deg. F. by means of diathermy current, with results as good as those obtained by producing malaria. The percentage of successful results is equally high; and the risks are fewer.

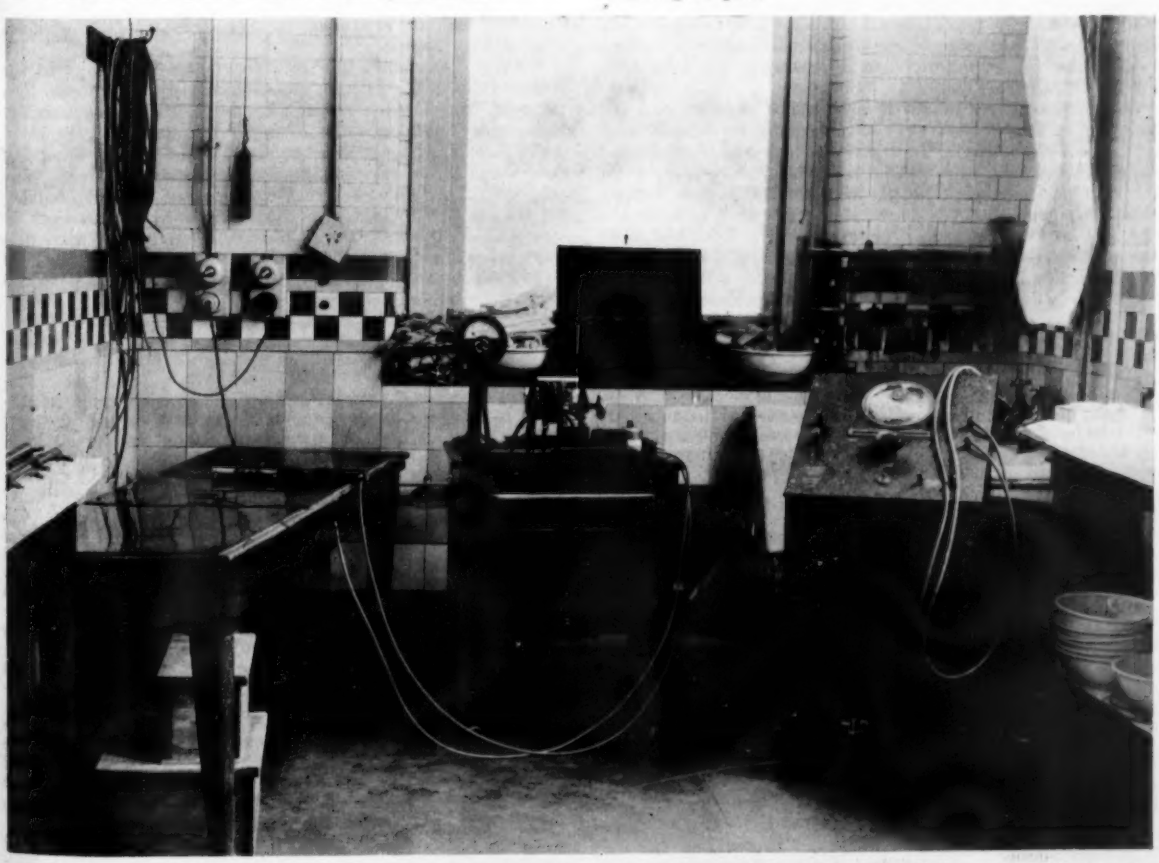
## Improving on Nature's Methods

The name " therapeutic fever " has been adopted for the treatment in which the temperature of the entire body is raised by means of high-frequency currents.

It might be argued that it is irrational to treat disease by subjecting the body to fever when Nature does not endeavour to cure it in the same way. But Nature does not always succeed. Local infection can persist for very long periods, and the rise of temperature produced by Nature's methods is insufficient to remove it. A much higher degree of pyrexia can be produced by diathermy current, and success achieved, as in the heating of the cervix uteri to 114 deg. F.—a much higher temperature than the maximum produced by Nature's methods.

It is quite possible that slowly progressing diseases which are far too chronic to produce a rise of temperature might come to an end if the body temperature were raised to fever heat for short periods by diathermy current, which would certainly be superior to the injection of foreign substances, which are sometimes harmful.

It is much too soon, at present, to predict the future of the treatment of disease by " therapeutic fever." A new page has been opened in the book of experimental therapeutics. The future will decide whether it is the beginning of a short or a long chapter.



**A corner of one of the rooms of the Electrical Department of St. Bartholomew's Hospital. Two diathermy machines can be seen. On the left is a " condenser couch " used in treatment by electro-desiccation**

# Avoiding Exchange Losses.

## By A. W. Willsmore, F.R.Econ.S.

### How exporters may protect themselves

THE recent departure of this country from the gold standard, with a consequent depreciation in the sterling exchange rate, while providing the British exporter with a means of reducing his quotations in terms of foreign currencies, has at the same time introduced an element of risk in overseas trade against which he would be well advised to cover himself.

The present situation, it is true, offers a golden opportunity for British goods to secure a footing in markets from which they were previously debarred by price considerations. It is, however, quite possible that this advantage may prove to be purely a temporary one.

Many exporters, in fact, feel disinclined to take advantage of the depreciation in the pound for fear of an adverse movement in exchange before they receive payment for their goods. Facilities are available, however, whereby the exporter can guard against this risk, and although in so doing he may forfeit any extra profit caused by a possible further fall in sterling, he should not neglect to take the fullest advantage of these facilities.

The function of the export trader is to sell goods, not to gamble on the possible future movement of the exchange rate. If he takes advantage of the fall in the pound in quoting prices in foreign currencies, without at the same time taking steps to fix the amount of sterling that he will secure for his merchandise, he is in fact gambling on the chance that the exchange will not move against him, and an adverse movement might well mean that all profit on the transaction is lost.

#### Fluctuations and their Risks

It may be advisable to give an illustration of the risks and advantages involved in the present exchange situation. Assume, for instance, that a manufacturer has an inquiry from France for electrical plant, the cost of which to the manufacturer is £3,200, and the normal selling price £4,000. Under ordinary conditions with the rate of exchange at about 124 francs to the pound he would quote, say, 500,000 frs. for the goods. At the present day, however, with the rate of exchange standing at less than 100 frs. to the £, he could afford to quote 400,000 frs. for his goods on the basis of a spot cash transaction, and still secure the same profit as before.

By thus offering a 20 per cent. reduction in price in the foreign market he would probably be able to take the order where it formerly would have been placed with some other competitor. The essence of the situation is that he can afford to offer this cut price so long as he is sure of getting £4,000 for his 400,000 frs.

But customers will almost invariably not pay spot cash for their goods. In this case they may demand, say, thirty days' credit, and the exporter is faced with the problem of what 400,000 frs. would be worth in sterling when he received payment in a month's time. It may, for instance, so happen that the pound improves in the meantime until it is worth, say, 120 frs., so that instead of securing £4,000 for his goods the exporter would in fact, get only £3,334, and if he had been working on a smaller margin of profit, such a development might easily lead to his making a loss on the contract.

It will be obvious, therefore, that the exporter cannot afford to take advantage of the depreciation in the pound to reduce his export prices unless he can find some means of definitely fixing exactly what he will secure for his goods. Such means are available in the principles of forward exchange. Broadly speaking, a forward exchange contract is an agreement to buy or sell a fixed sum in a foreign currency at a fixed rate and at a definite future date.

#### Where the Banker Comes In

That is to say, if an exporter were due to receive 400,000 frs. in thirty days' time, he could enter into a forward exchange contract with his banker whereby the banker would agree to purchase the francs from him on the due date at a certain definite figure established at the time of the contract. The banker would probably offer a rate of, say, 100.50 frs. to the £, so that in this way the exporter could underquote his competitors in terms of the local currency and at the same time be sure of receiving the usual price of £4,000 for his goods.

The only difficulty is that bankers are not always able to accommodate their customers with forward exchange contracts. It must be appreciated that the banker does not himself assume the risk entailed by a possible movement in exchange rates. The way he works is to secure as far as possible a balance in his forward exchange.

His function is to act as an intermediary, and having agreed to purchase so many francs in a month's time at, say, 100.25 frs. to the £, he would want to find other customers, British firms importing French goods, for instance, to whom he could arrange to sell the same quantity of francs at, say, 99.75 francs to the £. His profit is made through the difference of 50 centimes in the buying and selling prices, and he cannot afford to buy francs greatly in excess of the quantity in which he sells them.

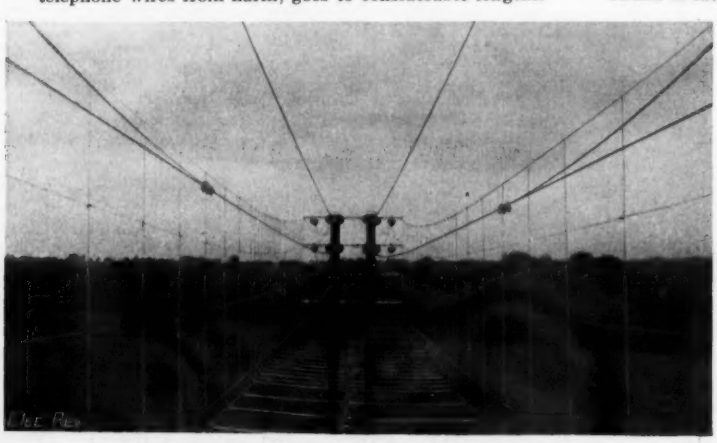
For this reason, before figuring a quotation in foreign currency, the exporter should ascertain whether his banker is able to accommodate him with a forward exchange contract, and if so, at what figure. At the present day, forward exchange contracts can be arranged in most currencies for periods up to three months. The rates that will be quoted will depend on the probable future movement of the particular exchange rate, and the period over which the contract is to last. In this latter connection it should be noted that the more closely one can specify the date on which the foreign currency will be delivered, the better the rate of exchange that can be secured.

Having ascertained the rate for forward dealings in the currency in which he is interested, the exporter can then proceed to figure his price in terms of the foreign currency with every confidence of securing a definite sterling sum.

The same thing applies, of course, quite apart from any considerations of taking advantage of the fall in the £. Any exporter dealing in currencies where there is any possibility of fluctuations in exchange should cover his transactions by forward contracts. And if the condition of the market is such that forward dealings are not available, the exporter would be wise to make an allowance in his prices for possible future movements in the currency.

# Pampering the P.M.G.

IT is well known to all concerned with the erection of overhead lines that the Post Office, in its zeal to guard its telephone wires from harm, goes to considerable lengths.



An elaborate cradle protecting G.P.O. lines in Essex

The Postmaster-General holds a privileged position in relation to other public service undertakings, which are by statute bound to satisfy him that their works are not in any way likely to interfere with the national communication circuits. Under the strict letter of the law he is not bound by the doctrine of "first comer."

The privileged position of the P.M.G. was accorded him by the Electricity Supply Act of 1882. Every subsequent Bill brought forward has aroused hopes of some improvement in the position of other public services. Conditions remain substantially the same, however, even under the Act of 1926, which altered so many other matters relating to electricity supply.

The protective measures enjoined by the Post Office are often very costly, and the accompanying illustration shows how far G.P.O. requirements can go and how expensive they can prove. This line is part of the 33,000-V system running between Romford and Ongar, Essex, and it was erected for the County of London Electric Supply Co., Ltd., by W. T. Henley's Telegraph Works Co., Ltd.

The elaborate cradle illustrated has a length of 100 ft.; it is 10 ft. 8 in. wide and 9 ft. high, and its construction involved the use of a large quantity of 5/16-in. dia. galvanised steel wire.

# Swansea Docks. By B. C. Williams

## Electrical equipment in the world's largest dock system

THE Swansea Harbour and Docks are part of the Great Western Railway docks undertaking. Electricity was installed forty years ago, and in 1910 the Swansea Harbour Trustees, then owners of the docks, erected an up-to-date generating station to provide power for certain appliances at the docks, and also to supply tenants with cheap electricity. The system of supply was 3,000-V, 3-phase, 50 cycle, and all motors up to 50 h.p. were connected to this system, transformers being installed stepping down to 440-V, 3-phase, 50 cycles, and also rotary converters for providing a 250-V d.c. supply. By 1916 the load had reached the full capacity of the plant, and the supply for further requirements was taken from the Swansea Corporation at 6,000 V.

### Change-over to Bulk Supply

In 1923 the entire docks undertaking passed into the hands of the Great Western Railway Company, which decided on a more extensive use of electricity as the motive power for cranes, pumping plant and machinery in the transit sheds. In 1925 it was decided to close down the generating station and take the whole of the supply from the Swansea Corporation.

The crane installation is of a noteworthy character, and deals with loads with the minimum of handling. The first extension made by the G.W.R. after taking over the docks included three 3-ton travelling portal jib cranes with level luffing gear, which were provided by Babcock & Wilcox, Ltd., for King's Dock. Two of these cranes are fitted with Scott patent grips, which obviate the damage to tin-plate boxes, black sheets, etc., which is apt to be occasioned by the ordinary chain sling. The height of lift is 70 ft. above the quay level, the radius is from 15 ft. 6 in. to 55 ft., and the hoisting speed is 200 ft. per minute. Three similar cranes have also been installed by the Clyde Crane & Engineering Co.

For the speedy handling of merchandise in the transit sheds portable 2-ton cranes are utilised. These cranes load the cargo on to runabout electric trucks.

Between King's and Queen's Docks an electrically operated Scherzer rolling-lift bridge was erected in 1913. It has a span of 100 ft., is 17 ft. 3 in. wide, and carries a single line of 4 ft. 8½ in. gauge and two footpaths 4 ft. 6 in. wide. The bridge is balanced by 340 tons of concrete and is operated by a 40-h.p. motor which can open the bridge in three minutes. The bridge was erected by Sir William Arrol (Glasgow) and electrical equipment is by Crompton's. The maintenance cost has proved very low. The bridge is depicted fully open.

### Electrical Pumping Plant

In 1916 the first electrical pumping installation was made when the pumping station at the North Dock was converted from steam operation. This station is used to pump water from the river for levelling the North Dock. The plant consists of three centrifugal pumps, each direct coupled to a 120-h.p. motor and each capable of an output of 18,000 gal. per min. The auxiliary gear consists of two air pumps for priming the main pumps, and one drainage pump. The conversion of this pumping station has effected a great saving.

The South Dock pumping station has also been converted. Three motor-driven centrifugal pumps have now been installed, each coupled to a 110-h.p. motor and capable of an output of 15,000 gal. per min. The auxiliary gear consists of two air pumps and two drainage pumps. It is claimed that the capital outlay will be recovered in a few years.

The whole of the docks have been electrically lighted by gasfilled lamps. The illustrations below show the lock of the King's Dock by day and by night. Electric light and power have also been supplied to the company's tenants; the Anglo-Persian Oil Company alone requires 1,000 kW for pumping crude oil from the tanker steamers to the storage tanks and thence to refineries at Skewen. All the dry docks, workshops, etc., are electrified.

Electrically operated rolling-lift bridge

### The Port Talbot Docks

Electricity was first used at the Port Talbot docks in 1898 for lighting and it has since been introduced for power. The Port Talbot docks system serves an extensive coalfield and is equipped with modern appliances for the speedy handling of coal. Two electric belt conveyors are installed with this object. After passing the weighbridge the coal is tipped into a hopper, and is then conveyed to the middle house, where it is transferred to the bridge belt (the total length of the conveyor being 251 ft.). The coal is transferred to the telescopic belt, and thence into the hold of the ship. The incline belt is driven by a 65-h.p. motor, the bridge belt by a 35-h.p. motor, and the telescopic belt by a 12½-h.p. motor. The bridge and telescopic belts can be raised to a height of 60 ft. and lowered to 12 ft. The coal is then conveyed by one continuous belt and discharged into the hold by a chute. This belt is driven by an 80-h.p. motor and a 5-h.p. motor is used for elevating the bridge, which can be raised 60 ft. and lowered 20 ft. The conveyors can each deal with 800 tons per hour.

The power for these appliances and for the use of the company's tenants is generated at the company's generating station and distributed on the d.c., 440-V, three-wire system.

At both the Swansea and Port Talbot docks extensions are in hand.

The lock of the King's Dock, Swansea, by day and by night

# The Canvass: Preliminary Considerations. By W. Smith

## The removal of irksome restrictions to clear the way

THE observations regarding electrical development which have recently appeared in your pages have prompted me to make a survey of the primary factors contributing to successful electricity supply.

The first matter needing attention is that of conditions of supply. Many authorities still require payment for: (1) service cable laid in private property; (2) meter rent; and (3) a minimum payment for energy. These three items are of paramount importance because they may be responsible for hesitation on the part of many householders to electrify their homes. Anything that impedes development should be subjected to immediate investigation. I will therefore proceed by making a cursory examination of the individual items.

### Service and Meter Items

With regard to service cable laid in private property, I can see no justification in making any charge except where the undertaking is involved in additional expense in fixing its apparatus in a position more convenient to the consumer. It is usually to be found that the occupiers of better-class property standing well back from the road are good consumers, and therefore the cost of the service is soon recovered in the charges for electricity.

Meter rents belong to the class of charge that everyone begrudges because they do not actually see anything in return. Many gas undertakings have dropped them altogether so as to be at no disadvantage with their competitors in this respect. By this means they have been able to retain consumers with boiling rings, wash boilers, etc., where electricity has been adopted for lighting; otherwise they might have lost their foothold entirely.

Inversely, meter rents often prevent electric lighting consumers from installing small electrical appliances, particularly where there is no suitable combined tariff available. This is to be deplored, for when one or two small appliances are used —such as an iron and a vacuum cleaner—they very often lead to the installation of larger consuming devices, once confidence in electricity has been established.

### Reduce the Minimum Charge

With reference to minimum charges for current, whilst I must agree that the supply authority requires some measure of protection against lack of use of the service at the consumer's disposal, I am firmly convinced that in many cases they stand at too high a figure.

Our competitors appear to have realised long ago that where electric lighting has been installed and gas lighting fittings removed they must be content to leave the service available for other purposes without imposing a minimum charge and running the risk of its entire exclusion.

There is also the question of slot meters to take into consideration, in which case the consumer usually evades the minimum charge on account of the difficulty of collection. In the event of such a supply remaining unused for any length of time, a letter from the supply authority to the effect that the meter will be removed until the supply is again required will usually have the desired result. Fortunately, however, such cases are very rare.

### Tariff Simplicity Essential

The question of tariffs for current has recently received a great deal of attention, and it is generally realised that existing tariffs are extremely difficult for the consumer to understand. It is therefore necessary for tariffs to be simplified and placed before the consumer in a manner which can be readily understood by all.

Whilst this suggested revision is in progress it is desirable that the tariffs should be based on electricity supply alone, instead of rateable values, floor space, and other irrelevant factors at present forming the basis of electricity charges. Personally, I should like to see more tariffs based on maximum demand, with a view to promoting the scientific use of current on the part of the consumer by attempting to level out his load, and thus improving the load factor.

If the consumer can be shown that it is in his interest financially to keep a close watch on his demand, the supply authority can look for improvement in its working costs; until this is achieved there is little prospect of cheaper electricity.

It is, of course, questionable whether the consumer can be educated electrically to this degree, but if it is not attempted and tariffs calculated to produce a good load factor offered as an inducement, the answer to the question will never be known.

### Power Tariffs

With regard to supplies for motive power, I was impressed by a tariff I came across the other day which appeared to be ideal for the small power user. It does all that is necessary in the way of inviting a good load factor, and, after all, is this not the only thing the supply authority can do to regulate the use of current by its consumers? The basis of the tariff is worthy of note, and I give the details below:—

QUARTERLY CHARGES.

| | |
|---|---|
| First 50 kWh per h.p. installed ... ... | 1½d. per kWh |
| Second ,, ,, ,, ... ... | 1¼d. ,, |
| Third ,, ,, ,, ... ... | 1d. ,, |
| All in excess ... ... ... ... ... | 1d. ,, |

The number of kWh per horse power would appear to be on the low side, but the general principle of the tariff is undoubtedly good. A similar domestic tariff with kilowatts substituted for horse-power would appear, on first consideration, to be undesirable on account of the difficulty of keeping an accurate record of installations comprising portable apparatus of a continually changing nature, and the tendency it would have to curtail the installation of highly rated apparatus.

But we are all well aware of the real obstacle in the way of an ideal alternative domestic tariff; we are virtually giving apparatus to consumers under the cloak of a simple hire agreement; our eyes are fixed on the amount of energy sold. After all, what does the maximum demand on the undertaking matter? Is not the present policy ill-considered?

### Sales Promotion

Most electricity undertakings now offer facilities for promoting the sale of energy. They have established showrooms, and introduced hire, hire-purchase and assisted-wiring schemes with this object.

Much interesting matter relating to showrooms has been published from time to time. There is one practice rapidly gaining popularity which I would like to see extended to all municipal undertakings as an aid to electrical development. I refer to the facility for payment of accounts for electricity, rates, water, etc., at the electricity showrooms. It is as cheap a publicity medium as can be found in these days of expensive advertising, and the undertakings that do not take advantage of it are missing a gilt-edged opportunity of increasing their turnover.

Schemes for the simple hire of apparatus are now common to many undertakings. A bright feature of the activities of many municipalities in this direction is that the schemes are financed from revenue. It is obviously realised that expenditure of a continually recurring nature such as this becomes a serious financial burden when borrowing powers have to be sought, for the hire income very rarely pays the capital charges and the cost of maintenance.

Assisted wiring is a commendable feature of recent development which invariably meets with a good response provided it is kept free from unnecessary obstacles. The most popular scheme would appear to be one under which repayment is obtained by collecting a small additional charge per kWh consumed, through a prepayment meter. Such schemes are usually limited to lighting installations, with perhaps a plug outlet for an iron or other small appliances which may be used on a lighting circuit. The idea behind this is, of course, to increase the energy supplied at the highest rate without appreciably increasing the demand.

Loans for this purpose are usually sanctioned for a period of ten years, and the scheme can be made self-supporting where the wiring can be executed at a reasonable price per point. The price per point to the consumer would be made up of the cost of wiring, plus approximately 25 per cent. to cover interest on capital over the period of the loan and a small estimated charge for maintenance. Where the scheme can be financed out of the reserve fund it is a good investment.

Whether the full rate of interest usually paid for borrowed capital shall be charged, or the difference between this and the rate of interest obtained from the bankers shall be passed on to the consumers under the scheme, is a matter for local decision. But with a reasonable charge per point, the success of such a scheme should be all that is desired.

### Canvass the Country

It is very desirable that an intensive canvass of the country should be made as early as possible. But many undertakings will lag behind because they are not prepared for intensive development and have not the facilities available to encourage it. Let us set about removing obstacles that are staying our progress! Then, when we can see a clear path before us, let us launch the campaign for which the country has been looking for years, with the confidence which it merits. But actions speak louder than words: Let us start *to-day*!

# Textile-Mill Conversions

## Electricity replaces steam in a large Yorkshire Worsted and a Scottish Tweed Factories

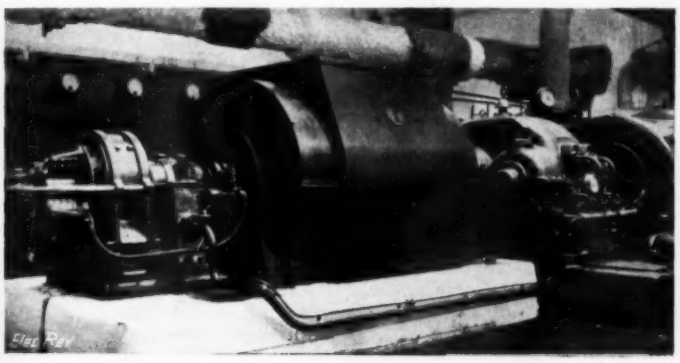
WHAT is believed to be the largest textile mill in the West Riding of Yorkshire to be wholly converted from steam to electric driving is the Whetley Mill of Daniel Illingworth & Sons, Ltd., Bradford, controlled by the Illingworth-Morris group. The scheme was completed in August last, and it marks the first step resulting from the decision of the group a year ago to secure the highest efficiency by electrification.

It seems curious that in the heart of a big city like Bradford the firm should have considered it advisable to install its own generating plant. True, steam is used for process work, but it amounts only to about 18 per cent. of that required for generation. The mill previously had a load equivalent to about 200 kW.

### Public *v.* Private Supply

A careful study was made of the overall costs for both private generation and public supply, and the figures were not only digested from the technical point of view, but they were also seriously considered and the decision was taken by men of such high commercial standing as Sir Donald Horsfall and Mr. J. P. Harrop, chairman and managing director, respectively, of the group.

The preparation and supervision of the complete conversion scheme was entrusted to Mr. W. O. Pepper, A.M.I.E.E., consulting engineer, Bradford.



**Turbo-alternator set (2,500 kVA) at Whetley Mill**

The mill was previously driven by three steam engines, one of which (1,200 i.h.p.), it is claimed, has the longest stroke of any engine in the world—ten ft. It occupies a space of 140 ft. by 15 ft. by 50 ft. high. The other two have a combined capacity of 1,800 h.p.

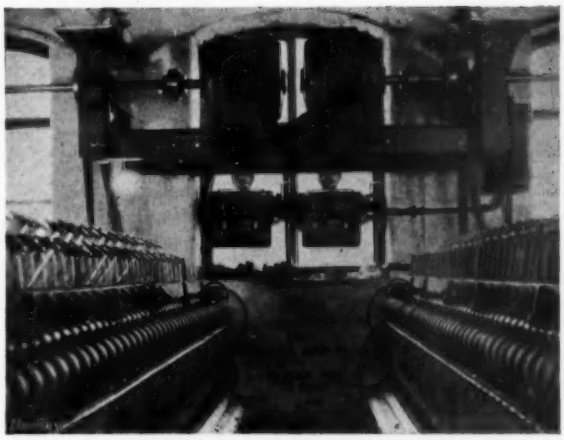
The power from these engines was transmitted through about 2,000 ft. of shafting and five or six miles of belting. This old plant, representing a total weight of over 600 tons, has been replaced by modern turbo-alternator and motor equipment with a total weight of less than 100 tons.

### Generating Equipment

The generating plant, installed in a new building erected on the site of three displaced boilers, consists of a modern design of large-reduction geared turbo-alternator, 2,500 kVA, 440 V, three-phase, 50 cycles, supplied by the English Electric Co., Ltd., for providing the day load, and a Bellis and Morcom steam reciprocating engine coupled to a 300-kW English Electric alternator for the night-load supply. On both the turbine and the engine arrangements are made for steam bleeding for process work. During the day steam is bled from the turbine at 10 lb. per sq. in. and is applied to machines which were previously heated with live steam at 100 lb. per sq. in.

While it is too early to sum up the operating results of the new plant, the saving already effected indicates an excellent capital investment, to say nothing of the increased production of the mill—the most important point. The steam required for all purposes with the old plant was 45,000 lb. per hour, and the consumption under the new conditions is 32,000 lb. per hour.

Owing to the more efficient conditions the demand for process steam has also been reduced from 8,000/9,000 to 5,000/6,000 lb. per hour. The consumption now includes the previous demand from the Corporation mains (200 kW) and also a new lighting load of 70 kW.



**Spinning drives in Whetley Mill**

The boilers generate steam at only 120 lb./sq. in. and 570/600 deg. F., but the new plant is designed for operation at 220 lb./sq. in. and 650 deg. F., under which conditions the consumption would be reduced by 7 per cent.

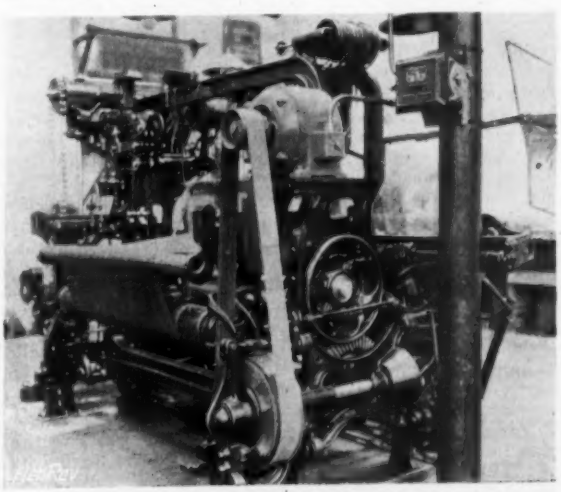
Owing to their good condition the insurance company declared a safe life for the existing boilers of from 10 to 15 years, and it was therefore estimated that no commercial gain could be effected by installing more modern boilers at present. By modifications and extensions, including a 600-ft. pipe-line, supplied by Unit Superheater & Pipe Co., Ltd., the existing water-cooling arrangements (surface ponds) serve for the new plant. The change-over scheme had to be carried through while the mill was in full operation, and the resultant difficulties called for much ingenuity, organisation and overtime.

The production of the mill is high-quality worsted, and the processes begin with the sorting of raw wool and proceed through the stages of washing, carding, combing, drawing, roving, spinning, twisting, warping and winding. Over 100 motors, ranging from 10 to 75 h.p., are employed in the installation, all of English Electric manufacture.

### Minimising Capital Costs

A high power factor is obtained without corrective apparatus of any kind—from 0.85 to 0.87 during the day and 0.83 at night. While this is not of such vital importance in connection with private generation as with public supply, the high figure has resulted in considerable reduction in initial outlay.

The total load on the motors is 2,450 h.p., while the aggregate capacity of motors installed is 2,690 h.p., a close margin lending to high commercial efficiency. All the motors are of simple robust squirrel-cage construction, and up to 30 h.p. they are switched directly on to the line, thus enabling an inexpensive form of switchgear to be employed.



**Self-contained loom, Bucclouch Mill**

With one exception, for a boiler-house fan, all the motors employing starters are served by star-delta equipment supplied by George Ellison, Ltd. Not the slightest difficulty has been experienced with the direct-on switching. If public-supply regulations had had to be complied with some £600 additional

expenditure would have been necessary in this respect.

From an open-type switchboard with ironclad equipment, supplied by English Electric Co., p.i. cables transmit the energy to special three-pole laminated switch-link boxes made to Mr. Pepper's specification. These boxes have no no-volt releases, but contain special emergency shunt stops. From the switch-link boxes the power is further transmitted *via* sub-distribution boxes to the various sections.

### Driving Arrangements

The installation in the mill proper is an outstanding example of the flexibility of the electric drive. The lay-out of the textile machinery provides little or no floor space for motor fixing, and the manner in which the great difficulties in this connection have been overcome is impressive; each scheme is neat and effective.

In each of the seven spinning rooms four 60-h.p., 720-r.p.m. motors are housed in steel structures attached to the roof girders—a pair of motors in each structure. Each motor drives eleven spinning frames.

In the drawing rooms 14 motors of from 25 to 50 h.p. each are housed in metal castings sunk in the walls, with only the pulley and the belt in each case protruding into the room. Another particularly interesting driving arrangement is that in the roving department where 10-h.p. motors are housed in cradles suspended from the roof girders. Each motor is directly coupled to a high-speed shaft with a jockey pulley, and the drive is taken down to the frame.

The carding room is a very unhealthy place for an electric motor—the atmosphere is humid and sometimes the temperature is over 100 deg. F. The two 50-h.p. motors in this section had to be secured amidst a very irregular roof structure, and to add to the difficulties pipe ventilation had to be provided. Five 75-h.p. motors, 945 r.p.m., serve very high-speed (over 9,000 r.p.m.) twisting frames. They are fixed on wall brackets and are directly coupled to the driving shafts.

The four sections of the combing room are driven by one 50-h.p. and three 30-h.p. motors placed on 16-ft. transomes supported by the shed pillars. Four motors varying in size from 15 to 25 h.p. serve the warping and winding sections.

The power wiring throughout is effected by armoured cable with flexible metallic tubing from the cable ends to the motors, &c., and the lighting wiring for 400 points is carried out with v.i.r. cable in screwed barrelling. A three-phase, four-wire system of cabling enables the lighting, 260 V phase to neutral, for the various sections, where more convenient, to be supplied from a power box, thus effecting considerable saving in wiring and transformers. The cables and wires were supplied by Standard Telephones & Cables, Ltd., and the wiring was carried out by Mr. W. D. Wilson, Bradford.

## Tweed Manufacture at Langholm

Another mill-drive conversion recently completed is that at the Buccleuch tweed mill at Langholm, Scotland, of Messrs. Arthur Bell & Co. In this case there was no public supply available. The mill shafting was originally driven by a 150-b.h.p. gas engine, supplied from producer plant on site, and there was a dynamo belt-driven from the shafting for lighting some of the departments. As an experiment a 30-kW alternator was similarly driven for about a year and supplied small loom motors. Process steam for use in the dyehouse and mill proper, and for general heating, was generated in a 28- by 7-ft. Lancashire boiler at 50 lb./sq. in.

### The New Main Plant

As the initial step in the conversion scheme designed and supervised by Messrs. R. D. Munro & Geo. Ness, consulting engineers, Glasgow, a Babcock & Wilcox water-tube boiler, with a chain-grate stoker and superheater, and a Green economiser, were installed in a new house adjacent to the old boiler. The boiler steam conditions are 200 lb./sq. in., and 537 deg. F.

Clearance of the Lancashire equipment on completion of the new boiler provided an excellent site for the generating equipment—an "Allinwun" turbine with a sub-base condenser manufactured by W. H. Allen & Sons, Ltd., gear coupled (8,500 to 1,500 r.p.m.) to a 150-kW alternator, 50 cycles, 400/440-V, and a field exciter, made by Bruce, Peebles.

The turbine has four stages and 5,000 lb. of steam per hour can be bled from it at 20 lb./sq. in.; the pressure being controlled automatically by the pass-out valve gear, irrespective of quantity. Arrangements have been made for the utilisation automatically of live steam in the event of the demand for process steam exceeding the quantity passed out from the turbine.

As soon as the pressure in the l.p. steam receiver is reduced to 18 lb. per sq. in. an "Arca" valve in the saturated-steam line automatically admits steam from the line at reduced pressure. The receiver is situated in the l.p. main and acts as a buffer in the event of the process-steam valves being opened very rapidly.

A feature of the "Allinwun" set is that the condenser requires no separate foundation, and is secured by flanges and bolts to the alternator base. The vertical single-stage condensate pump is gear driven from the turbine shaft, while air is extracted from the condenser by a two-stage jet air ejector, using condensate as the cooling medium. The turbine house is about 17 ft. above the low-water level of the river, and 180 ft. distant, and in consequence a vertical duplex pump is installed to provide the necessary circulating water.

The main electrical control is effected by an open-type switchboard supplied by Adamson, Green & Co., Ltd., and fitted with a Cox-Walker voltage regulator. From this switchboard is fed a central distribution board from which the various circuits are wired in v.i.r. cable in conduit, except in the dyehouse and scouring house, where, owing to the humid atmosphere, uncovered v.i.r. cable is secured in position by porcelain insulators.

About 150 h.p. of motors, varying from fractional h.p. machines to one of 60 h.p., are installed throughout the mill, the largest being of the slip-ring type, 965 r.p.m., and most of the others of the squirrel-cage design. The 60-h.p. machine is controlled by an oil-immersed starter fitted with overload and no-volt releases, an ammeter and a watt-hour meter. A 20-h.p. motor is also served by an oil-immersed starter, while all the others of appreciable size are governed by air-break star-delta fully automatic starters.

### Production Processes

Pure wool is the only raw material used in the mill, and it is first scoured or cleaned and then dyed as required. The dying vats are each served by a 3-h.p. motor, keeping the liquid in circulation. The next operation, drying, is effected in a chamber through which steam-heated air is drawn by a fan driven by a 9-h.p. motor. After batching of the dried wool (proportioning the colours, etc.) it is subjected to a combing operation (teasing) to render it uniform, the teasing machine being also served by the drying-fan motor. Scribblers, carders and condensers produce yarn which is wound on to spools ready for spinning, and all this plant is driven by the 60-h.p. motor.

One of the many unique problems met with in mill-driving conversion work presented itself in connection with the installation of this large motor, and the solution affords a very neat and effective drive. Owing to lack of headroom the main driving shaft, 97 r.p.m., could not be belt driven direct from the motor pulley. A countershaft is therefore employed, belt driven from the motor pulley at 228 r.p.m., and the further speed reduction is effected by Renold-chain and gearing. The motor is located in a hole in a partition wall, and parallel to the wall, the driving belt being arranged on one side of the wall and the gearing on the other (see illustration on p. 832).

Except for two self-contained looms with 1½-h.p. motors, all the machines in the loom shed are driven by a 20-h.p. motor *via* an overhead shaft. Of various processes in the loom shed to allow handling of the yarn, warping and beaming are served by ½- and 2-h.p. motors, respectively, arranged overhead.

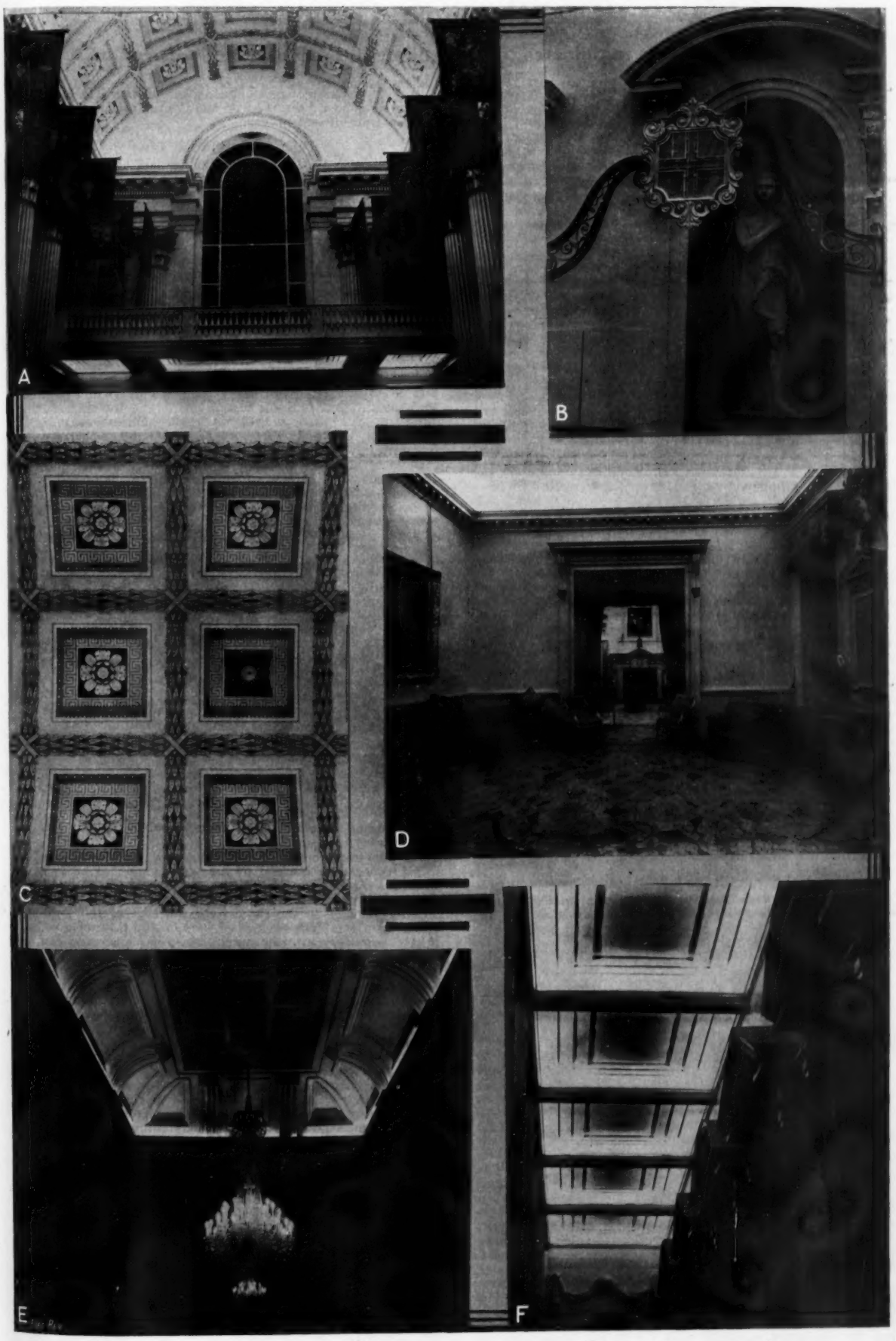
With one exception in the mill house the five motors afford individual drives. A "stock" machine is driven by a 4-h.p. motor and a 10-h.p. motor drives a mill machine. A 15-h.p. motor in this section serves a steaming and air cooling machine, an 8-h.p. motor a centrifugal hydro-extractor, and a 5-h.p. motor two washing machines. A tentering machine, on which the cloth is drawn over steam-heated pipes while stretched is driven by a 3-h.p. motor, the hot air being extracted by a small motor-driven fan.

In the finishing department, raising and cropping, etc., are carried out on the usual machines. A 5-h.p. motor drives a rotary brush and a hydraulic-press pump; a 3-h.p. motor serves for raising and one of 1 h.p. for cropping.

It was interesting to learn from Major E. J. Bell, principal of the mill, that the conversion has effected a saving in fuel and ash-handling costs, greatly reduced smoke emission, steadier driving, a great reduction of noise, and easy starting up without auxiliary power.

The rearrangement of the shafting and the drives and the installation of the motors and starters and all cabling was carried out by Messrs. Arthur Bell & Co.'s own engineering staff under the supervision of the consulting engineers.

With the exception of the 60-h.p. motor supplied by the Metropolitan-Vickers Electrical Co., Ltd., and a few by Brook Motors, Ltd., and Wright Motors, Ltd., all the motors were ordered from Bruce, Peebles & Co., Ltd. Most of the starters were supplied by Allen, West & Co., Ltd.



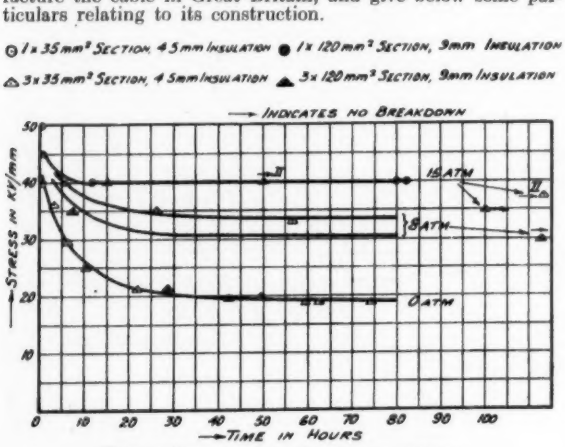

**New electrical installation at the Mansion House, London** (*See page 826*)

**A. Restored gallery and columns of Egyptian Hall; B. Marconiphone loud-speaker installation; C. Section of the ceiling of the Egyptian Hall, photographed by artificial light; D. The Main Drawing Room; E. Central fitting and cornice lighting in the Saloon; F. Lighting of ceiling beneath gallery (Egyptian Hall)**

# The Pressure Cable

## Many advantages anticipated in the directions of cost and operation

IN the last issue of the ELECTRICAL REVIEW, we reported a paper read before the Royal Society of Arts by Messrs. M. Hochstadter, W. Vogel, and E. Bowden on the "pressure cable." We have now obtained further information from the Enfield Cable Co., Ltd., which is arranging to manufacture the cable in Great Britain, and give below some particulars relating to its construction.


1 x 35 mm² SECTION, 4.5 mm INSULATION
1 x 120 mm² SECTION, 9 mm INSULATION
3 x 35 mm² SECTION, 4.5 mm INSULATION
3 x 120 mm² SECTION, 9 mm INSULATION
INDICATES NO BREAKDOWN
STRESS IN KV/mm
TIME IN HOURS
15 ATM
8 ATM
0 ATM

**Time-voltage curves of pressure cables**

One of the important features of this development is that it enables the limits of maximum stress and operating temperature to be considerably raised by methods that are not far removed from present practice. It is based upon the well-known principle that the dielectric strength of an insulating medium, such as impregnated paper, is increased by mechanical pressure, but this is the first instance of the application of the principle to cable manufacture.

The limits of stress and temperature, which are due to imperfect homogeneity of the insulation and particularly to the enclosure of gas-filled and vacuous spaces, can be obviated, as regards the time-voltage curve and stability, by closing the spaces by compression.

In the "pressure-cable" this effect is obtained by the use of a pressure medium (*i.e.*, compressed nitrogen), separated from the cable by the impermeable flexible wall of its lead sheath. (About eight cylinders of nitrogen are required for a mile of 120 sq. mm. cable.) This design enables the best media to be used for insulating the cable and for creating pressure, respectively.

### Breakdown Strength and Working Temperature

From the curve reproduced it will be apparent that a pressure of 15 atmospheres raises to a remarkable degree the breakdown limit over a long period, *viz.*, to 40 kV per mm., which is more than double that obtained at atmospheric pressure, and which is very nearly the ultimate value for impregnated paper, while the working temperature can be raised to 75° C. and more without jeopardising the stability of the cable.

**Cable ready for end box**

**Connection between pipe-line and end box**

The cable itself, as has been implied, is constructed on standard lines, but advantage is taken of the economies possible with the use of a thinner lead sheath and a thinner dielectric. Thus, a section of 66 kV cable which we inspected has the insulation normally used for 33 kV; this cable, we were informed, has been subjected for several months to a stress corresponding to 88 kV. Tests are also being carried out on cable for 132 kV.

The chief departure from standard practice is in the use of a pressure-tight steel pipe-line, but this is a novelty with regard to electrical work only, as long-distance installations of this kind have been used on the Continent for many years for the transmission of gas.

### The Pressure Pipe Line

The pipes in 10- to 14-ft. lengths are laid above the trench and welded together, one of the pipes being provided with a corrugation to relieve the weld of stress due to temperature variations. The pipes are coated with a special paint, and protected against chemical action by impregnated wool felt.

Experiments indicate that cable lengths up to 550 yd. can be drawn in easily, although the difference in the diameters of the cable and pipe need be no more than 10 to 20 mm.

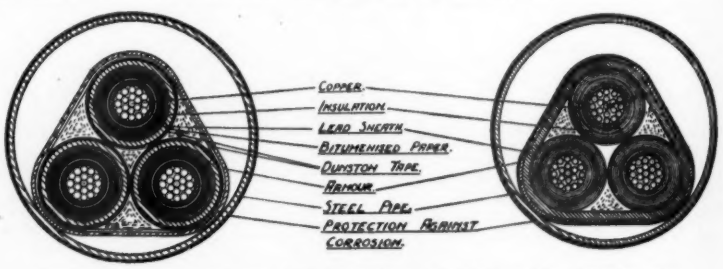
The absence of the two layers of jute and hessian tape applied above and below the armouring of the ordinary cable reduces considerably the heat resistance, while the pipe itself acts as an efficient radiator; the gas pressure also assists in carrying the heat away.

The cable may be of any of the recognised types, e.g., multi-core or S.L. Tests have shown that for a 3-core cable a triangular lead sheath is advantageous, since its sides can be pressed in and out more easily than can those of a circular lead sheath, thus forming a good membrane for transmitting pressure. If S.L. type cable is used, the cores may be of circular or elliptical cross section, the latter offering some economy in space and material.

In view of the importance of the lead sheath as a membrane, particular care must be exercised in its manufacture to secure uniformity, and, in this connection, a reference may be made to the advantages offered by the Henley press, which was described in the ELECTRICAL REVIEW of August 21st.

### Jointing and Fault Localisations

The cable joint is, like the cable, provided with a flexible wall to transmit the pressure. Irregularities in taping are corrected by the outer pressure, and not, as in ordinary cables, by increasing the thickness of the taping.




**Ordinary H.S.L. cable and H.S.O. cable as pressure cables in pipe line**

The pipe joint consists of a steel sleeve of sufficient diameter to be passed over the end of the pipe before the cable joint is made. After the cable is jointed, the sleeve is pushed over the two collar-like pipe ends and welded to them. In order to avoid damage to the cable from the heat of the welding, the ends of the pipes are turned back in the form of a collar. If it is necessary to open a joint the collar and weld can be cut away at the weld and the pipe slipped back, leaving still enough of the collar to remake the joint.

End boxes are also pressure-resisting and gas-tight; the best insulation for this purpose is considered to be bakelised paper, and for outdoor boxes porcelain insulators are used. The ends of the cable are taped up so that no oil can leak into the end boxes.

The end boxes and the pipe-line are provided with manometers which show, at a distant point of control, the pressure in the gas system. A fault in a pressure pipe can be located by measuring the rate of flow of gas from both ends. Since the resistance to flow per yard in the pipe-line is constant, with the same pressure at both ends (provided the rate of flow is not enough to cause turbulence), the rate of flow is inversely proportional to the distance of the fault from the ends. Resistances in the form of fine sieves are fixed at both ends of the joint sleeve with sand between them to reduce the rate of flow, and to retard the escape of gas that would otherwise follow a breakage.

**Welded pipe joint**

**Joint sleeve in pipe line**

Should a fault occur in the cable itself, the procedure as regards localisation and repair is precisely the same as in the case of any ordinary cable drawn into a duct line.

# MEETINGS AND DISCUSSIONS

## Current Topics and Opinions Expressed at the Institutions

### Possibilities of the Future

MR. A. P. M. Fleming, C.B.E., was the speaker at the conference held under the auspices of the ELECTRICAL DEVELOPMENT ASSOCIATION on Friday last week, and Mr. C. C. Paterson, O.B.E., took the chair.

A great part of the lecture was devoted to a consideration of world economic factors, a brief sketch of the fundamental scientific discoveries upon which the industry is based and their practical development. It had become clear, Mr. Fleming said, that the future of any industry could no longer be regarded from the local or even the national point of view, and we must consider the matter internationally.

#### POST-WAR PROBLEMS

As a result of the War, many countries which were previously buyers of our manufactured goods had become competitors; and manufactured goods could be produced to a large extent under conditions requiring little if any skill on the part of the worker.

Ultimately various countries of the world would, in self defence, have to join together to form units which would be self-contained in so far as they would have a suitable agrarian population and resources in addition to their manufacturing resources. It was hoped that the British Empire might constitute one such unit. In any case there would have to be much closer relationships than existed to-day for governing matters such as wages, hours of employment, &c. The alternative was some adjustable system of tariffs, but the injudicious application of tariffs might undermine rather than stimulate enterprise.

The allocation of an adequate sum to be devoted to scientific research was a matter of very great importance to any industry. The electrical industry in this country had suffered because anyone with capital could start manufacturing in any branch. He wondered whether sooner or later steps would not be taken to prevent the introduction of new capital for the production of goods already being supplied by an industry well equipped to meet the demands. It was better that such capital should be devoted to the development of new enterprises.

#### A SCIENTIFIC AND HEALTHY INDUSTRY

One of the chief factors contributing to the progress of the electrical industry was that it was founded on a scientific basis, with highly trained scientific staffs and workers. Mr. Fleming emphasised the manner in which the basic experiments of subsequent investigators had each in turn stimulated practical development.

That the electrical industry was amazingly healthy as compared with some others was demonstrated by tables exhibited by Mr. Fleming, who forecast that much more progress would be made even in our time in generation, or, in other words, the transformation of the latent heat of coal into electricity. Losses were incurred in boilers, turbines, generators, and in transmission, and at the generating end we might go a long way towards the use of gas cells, or some direct means of transformation.

There were great possibilities in the use of extreme temperatures and pressures. We could to-day obtain pressures ranging from 40,000 atmospheres down to a millionth of an atmosphere, and could produce temperatures ranging from two or three thousand degrees C. down to within half a degree of absolute zero—at which latter temperature most conductors appeared to have no resistance.

The development of new materials would enable us to produce prime movers of much greater output per unit of weight, and would lead to further economies in respect of space occupied and other ancillary matters. It was increasingly important that our scientific development should be as rapid as possible, for our foreign competitors were as active as ourselves, and those who got in first scored heavily.

Higher transmission voltages would be used, especially where great distances had to be traversed, and he pointed to the important possibilities of using d.c. transmission as a link between a.c. sources of generation and a.c. distribution. By such means we should overcome many of the problems of instability which occurred to an increasing extent as higher voltages were used. The primary arrangement employed in this connection would be a thermionic device with a capacity of 10,000, 20,000 or 30,000 kW.

#### TREMENDOUS SCOPE

The immense fields available for the development of the use of electricity were emphasised, and Mr. Fleming mentioned particularly the opportunities in farming, in therapeutics and in the domestic sphere. It was admitted that electricity had been applied in many directions in connection with the curing of disease, but we were only yet toying with the idea. As to domestic applications, it was time that women played a greater part than they did in the architectural design of houses, both inside and out. We needed fresh ideas—houses designed so that they could be run electrically throughout and provided with all the amenities that electricity could give.

Of the 10,000,000 or so homes in the country, only 20 or 25 per cent. were wired electrically. The organisation of an electrical week in every large town in this country once a year, he suggested, would do much to make the people electrically conscious, and would give them an opportunity to be up to date with the developments in domestic appliances.

He emphasised also the value of attracting to the sales organisations to an even greater extent than at present the best brains available, men and women capable of sensing the possibilities of creating a market, able to stimulate new demands and inspire the designers and manufacturers.

### Electrifying the Countryside

AN outline of the present position with regard to the organisation of the electricity supply industry was given at the PUBLIC WORKS CONGRESS at the Royal Agricultural Hall, London, on November 17th by Mr. E. W. Dickinson (rural development officer of the Electricity Commission). He emphasised in the first place the prime necessity of extending the availability of supplies and low prices. Apart from the enormous domestic field for the extension of the use of electricity, other applications were extending rapidly in rural districts. In the Preston area 56 poultry farms were consumers of electricity, some taking as much as 87,000 kWh per annum, and at Corstorphine about 800,000 kWh per annum was used by one large poultry farm.

The potentialities of the canning industry as a consumer of electricity, subject to attractive tariffs, were evidenced by the statement that the output of cans in this country increased from one to thirty millions per annum in four years, from 1925 to 1928.

All indications pointed to the establishment of canneries in country districts and electricity for power and heating purposes would be required.

#### OVERHEAD LINES PREFERRED

In the rural areas the fullest possible use should be made of overhead lines in order to ensure economy and to enable the maximum service to be given at the lowest possible price. Restrictions on the use of overhead lines, if they were such as to leave no alternative to underground distribution, would interpose serious obstacles in the way of the wide extension of rural supplies on an economic basis. He also urged simplicity and uniformity of tariffs; some general similarity in the trend of prices could now be detected.

In Bedfordshire, after two years of development, the annual consumption per consumer for domestic purposes averaged 608 kWh, giving an average revenue of £5.93. The indications were that the scheme would be a success financially. The area covered was 101 sq. miles, but Mr. Dickinson suggested that in order to obtain the best results the minimum area should be about 400 square miles.

Figures indicating the progress made towards the reorganisation of the generating side of the industry were given by Mr. J. M. Kennedy, who said that it was fairly generally agreed that some co-ordination of distribution would be necessary, and he hoped that it would be brought about by the voluntary action of the distributors.

He urged greater use of electricity for machinery used in the making of roads, in building, and so on, through arrangements with supply authorities for temporary supplies.

In emphasising the importance of using overhead lines, Mr. Kennedy quoted a hypothetical case in which consumers would have to contribute at the rate of 1d. per kWh consumed towards the cost of distribution if it were effected by overhead lines, whereas they would have to pay 2d. if underground cables were used.

#### THE BEDFORDSHIRE SCHEME

Mr. Jenkins (Bedford), giving particulars of the Bedfordshire scheme, said that during twelve months they had installed 129,000 yards of overhead lines, nearly 27,000 yards of underground cables, and 42,000 yards of low-voltage distribution cable.

Overhead distribution was adopted for supplying consumers on the fringes of villages. A number of the villages, however, consisted of only one street, and in such cases the difference between the costs of overhead and underground distribution was not so much as was indicated by Mr. Kennedy. Cables could be laid in the grass verges at a cost of about 6d. per yard, and there was the advantage that the maintenance costs were nil. The formalities preceding the granting of permission to erect overhead lines led to serious delays.

He emphasised the importance which poultry farmers were attaching to the use of electricity, partly because it gave them automatic temperature control in incubators. He would not be surprised if the advent of electricity in rural areas increased poultry farming to a great extent.

Improved telephone facilities in the villages had helped electrical development considerably because it enabled consumers to establish contact easily with the supply authorities.

#### FURTHER VIEWS

Mr. R. Borlase Matthews said that much good would result from co-ordination between the farmers, implement machinery makers, electrical plant manufacturers, and supply authorities.

Mr. R. L. Acland (E.D.A.) said that the E.D.A. Rural Electrification Committee was in close touch with people in the rural areas, and received a very large number of letters from them seeking help in obtaining supplies, and asking why electricity cost so much.

Mr. Nimmo added strength to the plea for making the maximum use of overhead lines, and said that even in areas having a population of only 100 persons per sq. mile electricity supply was feasible.

Mr. E. Kilburn Scott criticised the policy of transmitting at 132,000 V and transforming down, bearing in mind the low cost of generation when Diesel engines were used as prime movers.

Sir John Brooke suggested that if it were generally known that supply was cheaper by overhead lines than by underground cables, much of the opposition to them would disappear, for he believed that opposition was based largely on the belief that it was as cheap to supply from one as the other.

Mr. Dickinson, in reply, said that about sixty farms had been connected to the mains in the area of the Bedfordshire scheme recently.

## Reducing Line-Construction Costs

SHORT addresses by the retiring and new presidents of the OVERHEAD LINES ASSOCIATION were delivered at a meeting in London on November 18th.

Mr. W. C. Bexon pointed out that a few rural electrification schemes were being carried out on what he called a subsidy basis inasmuch as the charges for energy in other parts of the areas had to be higher in order to meet the costs of the rural supplies.

That was an unsound policy to pursue. All electricity schemes should be able to " balance their budgets " without a subsidy. There were five villages in his own area where the average revenue per consumer per annum ranged from £2 to £7, the villages in some cases having been connected for several years. One village had been connected for nine years and the average revenue was only £3. In these five villages the total number of consumers was 574, the total revenue received per annum averaged £2,322 18s. 10d., and the average revenue per consumer was £4. Until the cost of overhead lines and equipment for rural schemes was reduced by 50 per cent. little progress would be made. Therefore he urged the Association to impress upon the Electricity Commissioners the desirability of having special and separate rules and regulations for overhead lines for sparsely populated districts.

### STANDARDISATION MEANS CHEAPNESS

Mr. Jocelyn Swan announced that the membership of the Association was 232, including representatives of 158 electricity undertakings. He said that standardisation would go a long way towards cheapening the cost of the erection of overhead lines, but the Association had been very slow in allowing the cable manufacturers to produce a book of standards without any attempt at collaboration with the Association.

Whilst it was unnecessary for low-voltage lines to be strained to the factor of safety of 2, as allowed by the Electricity Commissioners, to strain only to a factor of safety of 4.5 made the lines too slack and unsightly. He was using the Aylesbury type of pole, the conductors being threaded through 1¼-in. holes into which " Chesham " glazed-porcelain insulators were inserted. The conductors were made off at angle or terminal poles only, at 400 to 500 yards spacing, and were 9 in. apart. No trouble had been encountered due to contact between phases caused by numbers of birds sitting on the top wire in one span length.

### LINE CONSTRUCTION COSTS

Mr. Swan said he had erected 925 yards of 0.10 sq. in. four-wire line at the roadside, including all labour, material, and transport charges, but without the chief engineer's time and office expenses, for £465 per mile with copper at 6½d. per lb. For 11,000-V lines he used a flat triangle construction and the insulators were carried on a channel iron with centre bracket bolted to the channel iron, the whole fitting being fixed to the pole in one piece with two bolts. In this manner the top of the lower insulators was level with the top of the pole and it was possible to use poles 3 ft. shorter than those proposed by the Cable Research Committee. For duplicate insulators two fittings were bolted one on each side of the pole.

With this type of construction it had been possible recently to erect 0.10 sq. in. three-phase 11,000-V copper lines having a total length of 1.86 miles at a cost of £374 per mile for material and labour, this particular installation involving three road crossings, 600 yards of side of road construction with double insulators, one three-pole angle and H poles. The cost of copper in that case was 6.56d. per lb.

In conclusion, the president expressed the hope that during the summer meeting of 1932 members would visit his part of Buckinghamshire.

## The Scope and Advantages of Electric Welding

FEW people are aware of the important part electric welding plays in everyday life. It is the keystone of economical and reliable fabrication, components being lightened, strengthened, and cheapened to an unbelievable extent by the process. So contended Mr. C. A. Hadley in the paper which he read at the BIRMINGHAM ELECTRIC CLUB on November 20th.

He said that resistance welding had ceased to be an art, having given place to a mechanised process completely stripped of the vagaries of the human element. All the variables are predetermined under correct conditions, fixed once and for all by the setting of the machine, leaving the operator to place the work in position and remove the welded product. The outcome is dependability, speed of production and cheapness.

Arc welding also has its place well defined in the cheapening process; at first used for repair work, it has now found its place in the production department. There is greater latitude and freedom in design, and the designer can be assured that the strength and rigidity of the finished structure will be exactly what he designed. Pattern-making, with its delay and expense, is cut out, so that construction can be put in hand without delay. The heavy electrical industry has adopted this method of construction on a most extensive scale and the results have been remarkable. Several firms in the Birmingham district now undertake the production of weldings in the same way as the foundry produces castings.

In the mass production of comparatively small steel goods resistance welding often halves the cost of production. It is also more economical to weld two or more parts together to save machining operations which would otherwise be necessary if made from the solid. Whereas arc welding is a progressive casting process, resistance welding is almost instantaneous in action, a most important point in the prevention of distortion. Recent research has permitted two pieces of thin bright rolled steel to be welded together so quickly that the outside surface is not discoloured.

## Pit-Lighting Problems

VARIOUS aspects of the efficient illumination of coal-face workings and main haulage roads in mines were discussed at the second sessional meeting of the West of Scotland Branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS.

The chairman, Mr. A. Dixon, said that pit-lighting was in a state of flux and somewhat confusing. Mr. Stevenson expressed the view that, as regarded the illumination of the coal face, an increased output of 25 per cent. was possible if the candle power could be raised from 8 to 12. Present regulations as well as costs, however, prohibited that. The main danger was not explosions, but falls, and with more efficient lighting the danger from falls would be minimised. It was necessary that pit owners should be convinced that the increased cost was more than recoverable by increased output. He regarded the introduction of the big battery lamp as merely a temporary feature. What they required was a complete installation moving along with the coal cutter.

### MORE LIGHT, GREATER OUTPUT

Mr. Rodgerson called attention to statistics obtained between 1927-30, relating to nystagmus cases, which showed that the incidence rate with electric hand lamps was not far removed from that with oil lamps. He was of the opinion that so long as the hand lamp continued in use an increase in candle power was of little consequence. In America flood-lighting was more or less general. In Scotland 55 per cent. of the lamps in use were of the open or cap type, and the incidence rate of nystagmus was greater in Scotland than in most parts of England and Wales.

Better illumination would certainly mean increased output and cleaner coal. In many seams dirt bands were almost indistinguishable from the coal under prevailing lighting conditions. Not more than 5 per cent. of the light was reflected underground, and any further reduction by interposing frosted glass was out of the question. One type of electric hand lamp had two filaments, one for use while it was being carried to the face and both for use while the miner was at work. The regulations prevented its use, but he thought this idea worthy of favourable consideration.

Mr. Laird said that if he were lighting a coal face he would require a suitable a.c. supply. The lamps would be fixed by suitable fittings in such a manner that the beam of light would spread along the face right and left, and lamps would be placed every ten to twenty yards, depending upon the height of the seam.

Mr. A. B. Muirhead pointed out that the Mines Department was willing to help. The 12-V motor car lamp, which was the most robust type of lamp manufactured, could be adapted provided it could be shown that it was possible to transmit the power along the face without an undue drop in voltage. The 12-volt lamp would stand a voltage of 14, which could be allowed to drop to 10½ without affecting the lamp or the candle-power unduly.

### CONCEALED LIGHTING ADVOCATED

Mr. F. Anslow thought it would be well if they could concentrate on 12 V, which was sufficient to give a range of practically a little over 70 yards on each side of the gate-end road. Mr. Becket favoured concealed lamps and contended that the source of light should be shielded as when illuminat-

ing shop windows in order to avoid the naked light source being directly visible to the eyes of the worker.

Mr. Rutherford gave an account of how, in one case, he had reduced the voltage to 25 and used 15-W lamps with fair results. Where there was an undercut of from 5 to 6 ft., the man wanted to see at the back of his work, and, consequently, 12-ft. spacing was the maximum.

Mr. Crawford asked if small thermal controllers would not be better than fuses.

Mr. Burt pointed out that the miner was not always working alongside the face; sometimes he was between the actual working point and the light. Therefore, face lighting from, say, 4 ft. down, was practically hopeless so far as Lanarkshire was concerned.

## Some Electro-Medical Considerations

DETAILS of an investigation which throws new light on "duplex therapy" and other electro-medical applications are contained in a paper read by Mr. G. G. Blake at the ROYAL SOCIETY OF ARTS on November 25th. The author explained how a thermionic valve "Reflexometer" can be used to indicate human emotional stimuli, the effect being recorded by noting the fall of electrical resistance between electrodes applied to the subject.

At times, for no apparent reason, a subject becomes irresponsive. Heat restores sensitivity and the application of diathermic high-frequency oscillating current while the readings are being taken has not only maintained normal sensitivity, but at the same time provided control of the troublesome galvanometer drift, i.e., by varying the strength of the diathermic current.

This effect appears to be due to a rise of the e.m.f. caused by the rectification of a portion of the diathermic current in the right direction to balance the loss due to polarisation of the electrodes.

The author has discovered that when employing a quenched-spark generator for bloodless endothermic operations a constant current is always present in addition to the diathermic current. Rectification takes place and the cutting blade is always positive when sparking occurs, changing to negative when good contact is made with the flesh (the smaller electrode is negative to the larger).

This fact provides a good-contact indicator which should afford protection against diathermic burns due to faulty contact of the electrodes with the skin. An electroscope or galvanometer could be used as an indicator, and such a "contactometer" might be made automatic by incorporating a light-sensitive relay, actuated by the galvanometer spot-light, to switch off the diathermic current. The importance of good contact in delicate eye operations is obvious.

Duplex therapy has recently become prominent. It consists of the simultaneous application of diathermic and galvanic currents by means of the same electrodes. This appears to be more beneficial than either alone, and reduces the time of application by half, so enabling double the number of patients to be treated in a given time.

The new Child switch eliminates all the sensation (unpleasant shock and muscular contraction) which usually accompanies the making and breaking of a galvanic current.

The circuit across the output terminals of the "Multostat" (or other source of c.c.) includes an ordinary make and break switch in series with a specially wound choke and the usual therapeutic electrodes, the latter being bridged by a condenser of large capacity and of special construction. When the circuit is closed by the switch the high inductive action of the choke reduces the applied e.m.f. and the condenser gradually charges, thus relieving the patient from the momentary high-voltage kick. On opening the switch the e.m.f. of the condenser opposes the momentary e.m.f. of the choke and the condenser slowly discharges through the patient.

## Talking Pictures

THE methods and apparatus employed in the production and reproduction of talking motion pictures were described in a paper read by Mr. H. S. Hind before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on November 24th.

The author explained that the cameras in soundproof boxes on the stage are driven by motors electrically interlocked with the motors driving the sound recorders in a room some distance from the stage.

The wax recorder is a disc rotating at 33⅓ r.p.m., with a highly polished surface. The stylus is a triangular sapphire. To obtain the final records from a wax, it is electro-plated to form a "master," which is in turn electro-plated and a positive plate is obtained from which is taken the second negative or stamper used to produce the final disc.

The sound record is photographed on to the film in the form of a track 0.1 in. wide by the variable-density or variable-width methods. In reproduction a beam of light only 0.001 in. high extends across the sound track. The film passes before this beam at a constant speed, and as the amount of transparency of the film varies so the amount of light passed varies. This modulated light falls upon the photo-electric cell which, when polarised, develops an output proportional to the amount of light falling upon it. In some cases this current is in the neighbourhood of 0.2 microampere, and requires considerable amplification before it is passed to the speakers.

It seems that the largest field for the use of talking pictures has yet to be developed. Their possibilities as a medium for education and advertising are much greater than for entertainment. A large number of manufacturers have developed portable equipment which can be packed in a small number of comparatively light trunks for transportation for use in schoolrooms, showrooms, exhibitions, etc.

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**The Grid in Scotland**

Lecturing to a largely attended meeting of the PAISLEY ASSOCIATION OF ELECTRICAL ENGINEERS last week, Mr. J. Henderson outlined the operation of the Central Scotland portion of the national interlinking grid. Metering arrangements were explained, and it was stated that owing to the large amount of transforming plant used, some trouble had been experienced with power factor correcting apparatus in various works. A considerable amount of investigation had been made, and it was hoped that means of curing the difficulty would be placed in service shortly.

**Protective Gear in Mines**

In a paper read before the South Wales branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS at Cardiff on November 14th, Mr. Joseph Jones discussed "protective gear." He said that electrical energy had become such an essential factor in the life and prosperity of the mining industry that a very heavy responsibility rested upon the electrical engineer to maintain the supply under all conditions.

**Electric Lighting: Past and Future**

The curious "outbreak" of electrical invention eighty or ninety years ago, when various kinds of lamps were produced and even electric traction was considered, was referred to in a paper on "The Early History of the Electric Light" which Mr. J. Swinburne read before the ILLUMINATING ENGINEERING SOCIETY on November 18th. He said that the modern gas-filled lamp, in its larger sizes, had an efficiency of two candles per watt; the next step might be the utilisation of electron discharge.

**Electricity and Health**

The first of two lectures which Dr. Elizabeth Sloan Chesser is delivering to members of the ELECTRICAL ASSOCIATION FOR WOMEN in London on the subject of "Electricity and Health," was largely attended on November 23rd. The healing effects of static electricity generated by a Wimshurst machine in the treatment of the nervous system, rheumatism, neuritis, and the prevention and reduction of obesity were dealt with, with due warning against misuse of the treatment.

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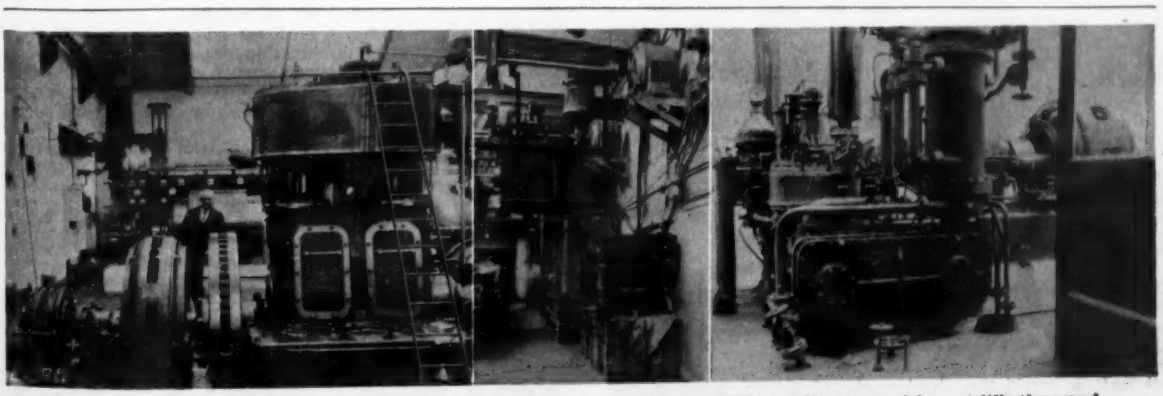


**Textile Mill Conversions** (*see pp.* 805 *and* 806): **Night load set in Whetley Mill; twisting room drives at Whetley; and generating set in Buccleuch Mill**

# Correspondence

*Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession*

## The Question of Leadership

The question is raised in your leading columns as to the individual or group of individuals competent to decide [discuss? —EDS.] matters of fiscal importance on behalf of the electrical industry.

Those who have considered the matter will doubtless agree that as the industry is at present constituted, matters affecting collective welfare are far beyond the scope of any existing group or institution and that rationalisation is long overdue. Not only should there exist a body capable of accepting responsibility and speaking for the industry, but, in addition, of wielding authority and maintaining discipline within the ranks. In this way the interests of all would be served and such desirable measures as the following obtained :—

(1) Enforcement of electrical rules and regulations in every installation.
(2) Electrical work to be carried out only by authorised contractors employing certificated or licensed wiremen and supervisors.
(3) Inspection and certification of every electrical installation by an independent chartered electrical engineer.
(4) Demarcation and recognition of the scope of activities of individuals and concerns, *i.e.*, manufacturers, supply undertakings, contractors, consultants, etc.
(5) Definition of individuals and bodies entitled to trade discounts.
(6) Registration and certification of all competent individuals.

It is apparent that far-reaching powers would be necessary to enforce these, and such powers could only be obtained with the approval of the whole of the industry and statutory legislation. Since, however, all engineers worthy of the name would benefit, can it be denied that such support would be forthcoming?

Of the many organisations now in existence we have pre-eminently the Institution of Electrical Engineers which, already in possession of a charter, might well extend its activities to cover those of other groups (which might become subsections) and thus become the central authority competent to speak on behalf of the industry. Then it could decide fiscal questions as above mentioned, and in addition, by exercising statutory control of the various branches, raise the status of the electrical engineer, *i.e.*, the corporate member of the I.E.E., and the whole industry. One might reasonably ask, in point of fact, why the Institution does not seek the necessary powers to enforce its recommendations as a preliminary.

A. STEAMHAMMER.

*November 18th*, 1931.

## Canvass the Country

I relish your leader, " A Pull All Together," and take this opportunity of emphasising your urgent call for " Action—prompt action." This is necessary if the enormous grid capital expenditure is to be of an early revenue-earning capacity.

We want leadership—politically and industrially. Further, you state : " We hope that as one outcome of our present discussion there will be some new thinking in electrical circles." By this you have already created the new thinking. Again, " Is the time ripe for the consolidation of electricity supply personnel—company and municipal alike—in one organisation?" The answer is decidedly in the affirmative.

Your leaderette " Putting on the Brake " shows the necessity for a powerful association. A few words will explain this. Many municipal trading departments are handicapped by the fact that quite a number of the committeemen are themselves traders, and object and retard whenever possible, publicity, showroom and sales development.

I do not for one moment suggest that a proposed new association will do, more or less, the work which E.D.A. is supposed to do. The latter has done all that was possible, but sufficient enthusiasm has not been created. A Commercial Association would greatly assist the work of E.D.A. in dealing with local conditions; the industry can only have continuity of expansion by increased sales of the commodity, and the commercial side can thoroughly specialise in this direction.

Cannot E.D.A. act as the parent body to such an association, the association itself being one of the sectional committees? Finance might be worked on similar lines to the National Association of Local Government Officers, each member to contribute an annual sum for membership fee. In the case of this Association an amount is collected monthly by the local treasurer and forwarded to headquarters. They are allowed a certain percentage for local expenses, and what is left over is handed to a benevolent fund.

Constitution of this suggested association will have to be carefully considered by company and municipal supply authorities and others. I think there are many outlets which can be explored to the benefit of the industry at large which at the present time are really outside the scope of E.D.A., but with an association co-ordinated with and subsidiary to E.D.A. all matters would then be brought within the scope of the parent body.

*November 20th*, 1931. PROTECTION.

Referring to your leading article and the correspondence on this subject, the time is certainly ripe for the consolidation of supply personnel, company and municipal alike, in one organisation, and I trust the splendid publicity you have given to this important question will not go unrewarded.

An Electrical Commercial Association, I have no hesitation in saying, could be immediately formed provided the commercial man's value to the industry is acknowledged. Give us representation on the National Joint Board, and members of the industry will flock to the Association in many thousands.

In municipal supply there are very many obstacles to overcome; some cannot be overcome, hence I would like to see the whole grid scheme under the control of Joint Electricity Supply Authorities, or the Central Electricity Board to step in and take full control of municipal supply—lock, stock and barrel.

*November 20th*, 1931. COMMERCIAL.

In your issue of November 13th, you state : " We have got to get right home to the minds of men with convincing facts and arguments. Then they will respond."

The firm in which I am interested has a piece of gear, with characteristics of special (and improved) character, which is wanted by users, and the efficiency of which should make them doubly want it.

We have trained engineers who are canvassing, personally, all the large potential users, but we find that (though these users are the people who are shouting " Buy British ! " and pressing their own wares) they have closed their own order books, *notwithstanding that they want this, or similar, equipment urgently.*

How can one get over such a situation? They themselves would have to shut down if users of their products were to act in a similar way.

*November 16th*, 1931. BUY BRITISH.

## Putting on the Brake

In the leaderette on page 762 of the current issue of your paper, under the above heading, it is possible so to interpret this as to give the impression that the Swindon Electricity Department has not any showroom facilities, and that we are standing still so far as the development of the supply to consumers is concerned.

May I point out that this is not so. There is at the present time a showroom combined with a demonstration room in the same block of buildings as the offices, and although small, it is adequately equipped and its work is conducted by an efficient staff, including a lady demonstrator who is constantly giving public demonstrations.

The records prove this, and for your information may I say that consumers are being added at the rate of over 1,000 a year. The total number of houses, factories, and other buildings in this town is approximately 16,222 and a supply is being given to 10,668, so that you will see the percentage is a high one. In addition to lighting, the connections for both heating and cooking are highly satisfactory and continue to grow rapidly.

We think it is only fair to point out that the showroom, the building of which has been postponed, is a new one to be erected on a site which will be more central, but it is involved with other buildings and such matters as road widening, &c., before it can be erected, and although it will eventually enable us to be still more progressive, the postponement is not likely to affect the development to the extent that your article would indicate.

A. NICKLIN, Engineer and Manager.

Swindon, *November 23rd*, 1931.

## Imported Glassware

The new anti-dumping tariff on imported glassware has made an exception of illuminating glassware; it is the only omission under the domestic glassware section. Why is this the case? Must the electrical and other lighting trades be the only ones which are exempt from the help of tariff protection?

We have firms in this country who can manufacture illuminating glassware of equal quality to any on the Continent. We have several large glass firms in the North of England capable of dealing with a much larger output than they are asked for at the moment. One of these firms which bears a world-famous name and is the pioneer of illuminating glassware has perforce to find its largest markets abroad.

The prices ruling in this market due to dumping of this imported glassware make it a difficult problem to develop and enlarge the sales of British glassware. This foreign glassware has undermined the patriotic feelings which should actuate all good Britishers, and in many cases the so-called " British fittings " are British metal work and foreign glassware. The number of importers of glassware whose sole business is the sale of this exempted product is in excess of those who deal in British glassware.

I have yet to see a "Buy British!" poster in a shop window lighted by a British shop window reflector. It should be possible, but I have not noticed it to date, though I have seen many of the foreign products shedding their rays on the stirring sign of "Buy British!"

I have made a *résumé* of all the firms who manufacture in Britain and in my little way I have endeavoured to act up to the showcard I display of "Buy British!" but I find that in tendering I am badly out of it on cost. I still believe a good British job is worth the money and cheap at the price as regards quality and durability.

Knowing, as I do, the amount of foreign glassware that is used in the electrical trade and the value of this market to us, I am surprised at this exception. As a Britisher I think it is unfair to make illuminating glassware the Cinderella of this section. Those firms who have built up a business against this foreign competition and enabled us to have even a small portion of this valuable market are as worthy of support as those protected by the Order.

It is time the section of the trade which this affects made some active protest against this omission so as to enable those who want to "Buy British!" to have a larger range and stock. Here the architect and electrical contractor would help by preferring the British to the foreign product. Your REVIEW might compile a supplement of firms who manufacture their goods in Britain and enable a contractor who has an inquiry for an all-British installation to see at a glance the list of firms from whom he can buy the components.

BRITISH CONTRACTOR.

*November 23rd*, 1931.

## Electrical Dumping

In your current issue I observe a leaderette headed "Electrical Dumping." When the majority of people in this country refer to "dumping" it is all in the one direction, but what about the dumping that is taking place the other way?

Take for instance foreign meters. Six months ago these could be bought in this country for 18s., but the "ring" price for the same type of meter was 25s., and these meters were being sold to wholesalers and shippers for export for 18s. or less. This I presume was not "dumping," but the home purchaser had to pay for the foreigner getting a cheap meter.

Buy British so that the foreigner can get the advantage!

Why cannot "ring" firms bring their prices down, and so increase their home trade by obviating the necessity of purchasers buying a cheap meter from abroad?

*November 20th*, 1931. BRITISH.

## Plugs: A Handicap

The admirable campaign recently embarked upon with the object of popularising the use of domestic electrical apparatus by installing plug points is, in my opinion, being seriously handicapped, and there are two matters which I think require the urgent attention of manufacturers and associations interested in the development of domestic apparatus.

In the first place, the I.E.E. Regulations recommend that three-pin power plugs should be installed. My experience has been that very little apparatus is supplied to consumers' premises with any earthing terminal provided, or with suitable flexible wire for connection to the three-pin plugs. In most cases, I believe, the manufacturers may be able to supply such apparatus if specially asked for it.

It would appear to me that if three-pin plugs are essential, as recommended by the Institution, then all domestic apparatus supplied to consumers' premises should be suitable for earthing and for three-pin plugs, and unearthed apparatus only supplied when specially asked for.

Electric kettles and irons are very often, in fact probably in the majority of cases, used in proximity to water supplies and cooking stoves, and the danger of a shock from such apparatus is very real, and has, of course, occurred. Our endeavours to press the use of three-pin plugs with earth connections on consumers' installations has had some measure of success, but has led to a considerable amount of unpleasantness, and the earthing of domestic apparatus can only be achieved with the help of manufacturers.

It seems unfair, in view of the I.E.E. Regulations, that this matter should be left to the individual undertakings to deal with. If the matter is essential, as I certainly believe it is, then it ought to be made easier by the manufacturers co-operating and only supplying the apparatus which meets the Regulations.

The second point is that the centres and sizes of the pins of the three-pin plugs should be standardised to secure interchangeability. It is appreciated that some effort has been made in this direction, but the position is chaotic at the moment, due to the fact that most manufacturers not only supply the standard article, but also plugs made to their own specification, which they recommend in preference to the standard article, and the two plugs are not interchangeable.

Moreover, the plugs supplied by one manufacturer rarely fit the sockets supplied by another. A case has just come to my notice in which a firm of manufacturers, and a large one at that, has not been able to supply plugs of the same dimensions as those supplied twelve months ago.

While the friction and trouble caused by these little matters exist, the question of popularising electricity in the home by the installation of a number of plug points is likely to be seriously retarded.

A. P. MACALISTER,
*Borough Electrical Engineer, Islington.*

*November 23rd*, 1931.

## Heating Plug Outlets

Having in mind the very low price at which heating current is now almost universally supplied, and also the remarkably efficient radiators obtainable at a popular price, the public are now realising that it is far better to purchase heaters, suitable for the purpose, than to have only one, and transfer it from one position to another as required.

Surely now is the time to revise the conventional idea of a combined switch plug, which after all has many shortcomings. I would suggest that a terminal box connector, controlled by a d.p. switch, would make a far more efficient job, and provide also the correct position to terminate the flex, and fix the switch.

The connector could be arranged for surface or flush fixing, and would take the heavy flex more efficiently than the plug top, and should be fitted just above the skirting, whilst the switch could be arranged at hand height, either at the side or front of the chimney breast, the two fittings being suitably connected for conduits or surface entry.

The correct position for all plugs should be immediately above, and not on the skirting. The only advantage of the skirting position is that it affords a firm fixing for the plug, and saves time, especially with deep skirtings with backgrounds, but this position involves risk of damage and inconvenience.

E. A. HALL.

Grimsby, *November 21st*, 1931.

## Electrical Trade and the Crisis

Having read the very able exposition of the foreign situation by Mr. H. C. Siddeley, appearing in the ELECTRICAL REVIEW of October 16th, I find myself at variance with the author on several points. Chief amongst these is his contention that the best way to increase foreign trade is by opening branches of the B.E.A.M.A. in the six principal markets mentioned, *viz.*, India, Australia, South America, South Africa, New Zealand, and Canada. The cost of this, Mr. Siddeley states, will be covered by the sum of £55,000.

This sum, divided among the six countries, would approximately give £9,000 each. Speaking of South America, it would be necessary at least to have offices of the B.E.A.M.A. in Argentina, Brazil, and Chile, and the sum of £9,000 allowed would be approximately £3,000 for each country. This sum would hardly be adequate to obtain really representative premises and staff. It is not made clear whether the B.E.A.M.A. should operate as a trading organisation; the display of electrical apparatus would imply sales, and it would be interesting to hear how the sales would be handled.

In addition, no goods would be sold without advertising, and there is no mention of how prospective clients would be attracted to the showrooms. The sum of £3,000 would certainly not allow for advertising. We believe that the better system would be the combination of a number of "specialist" firms each having its own lines, who could open joint offices. Success of foreign firms is due in a large measure to the considerable number of years they have been operating in the market; secondly, it is due to the low quality of apparatus made which enables them to quote cheaper prices. In addition, the multiplicity of lines they handle tends to give them an advantage over individual specialising firms.

It is necessary clearly to divide the electrical business into two classes: the domestic side, covering articles sold from stock, and the heavier machinery side. It would probably be found that Great Britain is obtaining her share of the heavier side, and presumably the exhibition of goods, etc., mentioned by Mr. Siddeley alludes to the domestic side of the electrical business. The B.E.A.M.A., or the Local Branch of the I.E.E., would be extremely useful as a source of information to British manufacturers for studying the market, taking the volume of trade, dividing it into its respective classes, and studying the actual articles sold with a view to giving British manufacturers a specification to which they could work of articles in demand.

I also feel that much good could be done by the B.E.A.M.A. in giving local students an opportunity of entering into English factories, thereby creating future demand for British goods.

The dearth of orders from overseas is often attributed to lack of salesmanship. There is no doubt that given the correct articles to sell at competitive prices the British salesman could produce results as good as or better than those of his foreign confrères, although in markets where English is not spoken it proves advantageous to use the salesmen of the country.

R. B. WHITTICK.

Buenos Aires, *November 13th*, 1931.

## Still the Boiling Plate

In Mr. Blair's letter we have a spot of genius. To combine the best points of electric and gas cookers in one piece of apparatus would indeed be a master stroke. The gas rings could easily be superseded when the electrical design warranted such a change. Gas and electricity are provided for the service of man and if to fulfil this it becomes necessary to combine both in one compound cooker why not do so?

Let the electric hot plate design and experiment proceed and take its place when it can prove its worth. In the meantime, think of the housewife with an electric oven, kettle and grill and gas boiling rings. She might even be persuaded that engineers do know something of the domestic problem of worry-free and fatigue-free cooking.

I have been very interested in the letters which have criticised my views on the position of the power points in the home.

My answer is this: The power plug points must be placed in the positions which are most convenient and in my view the position 3 ft. up from the floor is ideal. It is based completely on experience. First cost is an old bogy. Interference with a decorative scheme is worth careful study.

The "dangling flex" objection is a myth (in my opinion) and simply does not arise.

I cannot help thinking that the real reason for plugs on skirting boards is niggardly economy and lack of thought.

F. L. BEST.

New Barnet, *Nov. 18th*, 1931.

## Testimonials from Employers

Those of us who strive for the betterment of our profession will heartily sympathise with the sentiments of your correspondent, "Perhaps Worse Affected," in the ELECTRICAL REVIEW of November 13th, because they bring to notice a factor which is the root cause of the slow development of electricity supply.

My letter on "Distribution and Consumers' Engineers" in your issue of September 14th, brought me replies from all parts of the country endorsing my views. That letter was intended to encourage students and junior engineers to study more, because it is most unfortunate that so many obtaining a municipal post become too complacent and do not trouble to read the weekly electrical journals.

Without careful consideration of the training requisite, engineers cannot be put to distribution work with satisfactory results. A careful analysis of the methods of selection committees during the last four years has very definitely convinced me that a sound training in general engineering is essential. That no contrary views have been expressed shows that, at heart, the electrical profession is in agreement with my contention.

Cardiff, *November 13th*, 1931. BERNARD A. CRONIN.

## The Electric Drive in Factories

Mr. W. P. Conly may find the following information of interest:—

A 90-h.p., three-cylinder, crude-oil engine (two-cycle fitted with scavenger blower) direct coupled to a 60-kW d.c. generator, installed in 1931, cost, including foundations, £1,200. In a day's run of 10½ hours (figures picked at random from engine room log book), kWh generated amounted to 420, fuel consumption to 30.5 gal., lubricating oil 0.5 gal., and wages 12s.

Diesel oil costs 72s. 6d. per ton delivered. Our fuel consumption is over 100 tons per annum, the major portion of the fuel being consumed under a boiler.

I think Mr. Conly will agree that after allowing for repairs, cleaning materials, depreciation, etc., there is still something financially attractive about the oil engine generating set, even with electricity at 1½d. per kWh for *all* purposes.

I purposely stress the word "all," as we often carry a 60- to 70-A lighting load for three or four hours per day, and quite possibly we should find ourselves paying 2½d. to 3d. per kWh for this current if it were supplied from some outside source under one of those "ingenious wangles" known as tariffs.

Hursley, Hants., *November 16th*, 1931. A. COPELAND.

## Portable Electric Tools

With reference to Mr. H. Richards's article in your issue of November 20th, I would like to raise one or two points that were not touched upon by the writer, from the point of view of a user.

Regarding the question of electric drills, a few years ago a leading maker embodied a fuse in the carcase of the machine to protect it from overloads. In practice this was a failure, due to the human element. The operator drilling, say, sheet metal, was constantly stalling the drill, and blowing the fuse. The constant renewing of the fuse became a sore point, with the result that the fuse was progressively increased in size, eventually becoming simply a "link" and thus no protection at all.

Drills in an engineering works are usually supplied from a plug circuit, suitably fused to supply several drills operating at one time. As an alternative, sometimes the circuits are fitted with dwarf circuit breakers, but even these are not adequate protection for individual drills. One shoddy type of switch invariably "blows up" on the slightest stalling of the drill. The cost of switch renewals varies from 2s. 6d. to 15s. with these types of drill, and, although a source of annoyance and expense to the user, must be remunerative to the manufacturers, until the customer gets "fed up."

Turning to the portable grinder, we have to contend with the same difficulties. Imagine a foundry fettler handling heavy castings, the payment for which is a bonus scheme, based on tonnage. This man's aim is, naturally, to get a casting done as quickly as possible. Where the grinding wheels run from line shafting with plenty of reserve power he can "put pressure on the work." The same man just after going over to a portable electric grinder quite unconsciously exerts too much pressure, and the machine is soon burnt out. With the large and small tool-post grinders the same thing applies; it is impossible to get the "feel" of the wheel by way of a large slide rest. I am talking about drills working at 220 V d.c. and I am well aware of the advantages of three-phase h.f. tools, in regard to amount of power in a small space, low cost of maintenance, &c.

I think it would be a great advantage if the manufacturers would supply an over-load trip switch for drills and portable tools generally, or, failing this, a small ammeter with unbreakable face, with a red mark on the dial, at full load position, so that the operator could see what he was doing. Alternatively, the dial could be marked at three points—say light load, normal and over-load.

In conclusion I would mention that we are ordering no spares for the flimsy switches referred to, as we find that a well-known make of switch, with an underslung quick-make and long-break action can be adapted to most of the drills.

C. J. BENNETT,
*Electrical Supt., Westland Electricity Works*
*(Petters, Ltd.).*

Yeovil, *November 20th*, 1931.

## Electricity Charges in Victoria

Our attention has been drawn to an article in the ELECTRICAL REVIEW of September 4th last, page 377, entitled "The First Hundred Thousand." While we appreciate the prominence it gives to the various Australian utilities which have attained consumer saturation so much higher than that of Birmingham, we would like to point out that your correspondent is misinformed with regard to the rates charged in Melbourne by this Commission.

For your information we are enclosing a copy of our tariff schedule No. 1 which gives in detail the rates charged not only by the Commission, but by the various municipal councils (other than that of the City of Melbourne itself) which purchase in bulk and distribute in the metropolitan area. The total number of consumers covered by this schedule is 216,157 in a population of 911,100.

A copy of schedule No. 2 which covers supply in a typical medium-sized country town is also enclosed, and we shall be glad if you will kindly publish the correct rates in due course.

STATE ELECTRICITY COMMISSION OF VICTORIA.
W. J. Price, *Secretary.*

Melbourne, *October 19th*, 1931.

[We deal with these schedules in the Electricity Supply Notes in this issue.—EDS., ELEC. REV.]

## Electric Clocks

It is gratifying to us, as pioneers in this country of frequency control and synchronous clocks, to observe the interest which is being taken in the subject, as evidenced by your correspondence columns.

We are particularly pleased to note the prediction of Mr. Hope-Jones, the pioneer of the impulse clock, that before very long "all and every time-keeping job may be accomplished by a.c. synchronous motors—from the mantelshelf clock to Big Ben." But why does he suggest that "the next generation may see our grandfather clocks banished to the remote corners of our Isle, where gas or candles may still be found"? Grandfather clocks, and in fact almost all antique clocks, lend themselves most readily to being "Synclock" driven and that often without removing any of the existing wheelwork.

Referring to the relative advantages of the high and low speed clocks, Mr. E. A. Watson agrees with our contention that owing to the light weight of the high speed mechanism, "no wear of these parts takes place." He is in error, however, when he suggests that for this reason the slow-speed motor is at no disadvantage compared with the high-speed type. The two systems might, as he expresses it "attain parity" if the weight of the corresponding parts were the same. Actually, this cannot ever be so, for reasons which will be clear to designers.

To take a concrete case, the corresponding parts of Mr. Watson's clock weigh fifty times as much as those of the "Synclock," that is, the 200-r.p.m. wheel of the "Synclock" weighs, complete with spindle, about 0.5 gramme, whereas the corresponding 200-r.p.m. rotor of the slow-speed clock weighs 27 grammes. Added to this, the "Synclock" gears run in a sealed oil bath instead of relying upon a preliminary coating of oil or grease.

The arguments advanced by the advocates of the slow-speed clock would almost appear to be as follows: "We admit that the moving parts are much heavier, we know that the lubrication is inferior, we agree, therefore, that their life is problematical, but they are cheap to make, so let us risk it." To this we would reply that, for our part, we prefer to rely upon the twelve years' actual experience of the "Synclock" rather than to experiment on the public.

EVERETT, EDGCUMBE & CO., LTD.

Hendon, N.W.9, *November 23rd*, 1931.

# New Apparatus and Devices

## for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

### Portable Floodlighting Set

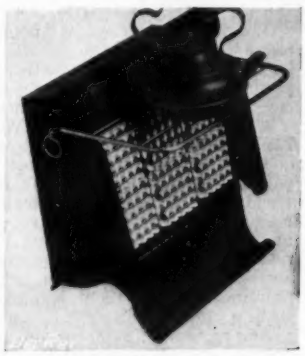
A portable emergency lighting unit recently marketed by BATTERIES, LTD., Hunt End Works, Redditch, is designed for use by breakdown gangs, in hospital theatres, power houses, &c. It consists of a "Nife" steel-plate battery housed in a polished wood box with a hinged lid and carrying handle. To this is attached an adjustable standard carrying the projector, which can be swivelled in any direction. Suitable cable and a plug are provided. When not in use the jointed standard can be taken to pieces and fitted in the lid of the box, so that the whole apparatus can be carried like an attaché case. A wide angle diffused light or a long narrow penetrating beam can be obtained as desired by a simple focusing adjustment.

The battery supplied will maintain the light for 10 hours on one charge, and the light allows the smallest newspaper print easily to be read at a distance of 100 yards from the projector. The maximum height of the lamp from the ground is 6 ft., and the overall dimensions of the carrying case are 7⅞ in. by 15¼ by 12½ in. The standard is adjustable so that the lamp can be used at various heights.

**Emergency floodlighting unit**

### Fires with Provision for Cooking

It is claimed by MESSRS. GIRLINGS, LTD., Electricity Works, Maldon, Essex, that the new design employed for two "Mosaic" fires which they have recently introduced, "Utility" and "Standard" models, renders the fires almost unbreakable, very strong, yet very light in weight. The flexibly mounted element is built of good-quality fireclay formers of a style which makes a very efficient base to carry spirals of high-quality nickel-chrome wire. The complete elements can be easily and quickly removed and replaced by unskilled hands. The cases are of sheet-metal and an interesting point is that the prices vary directly as the loadings—1, 2 and 3 kW, etc. The 2-kW size has two-heat and the 3-kW fire three-heat control. The "Utility" model is so designed as to permit cooking operations on it, and the 2-kW size will raise three pints of water to boiling point in 20 minutes. The "Standard" model is fitted with a guard with non-rusting steel bars which can be used as a trivet for warming food, &c., and the 2-kW size of this model will bring two pints of water to the boil in half an hour. The fires are obtainable in black, blue, brown, or maroon colours, and also in such special finishes as silver, bronze and gold.



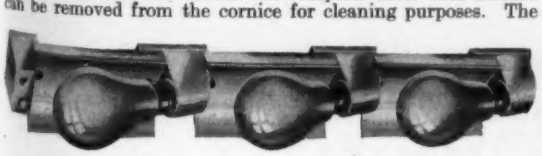
**Standard "Mosaic" fire**

### Aluminium Immersion Kettle

A low-priced three-pint kettle of simple construction recently introduced by H. G. MOSELEY & CO., LTD., Hospital Street, Birmingham, is made of aluminium and is of the immersion type. Loaded at 800 W it will boil its full complement of water in 11½ min. Standard models of this "Eddo" kettle are available for voltages of 100-110, 200-210, 220-230 and 240-250, each being supplied with a terminal guard, two yards of flexible lead, an adaptor and a connector. A specially designed mica element is fitted, and the element container is of patented solid-drawn construction, without seams or joints, to avoid any tendency to leakage.

### Cornice-lighting Strip

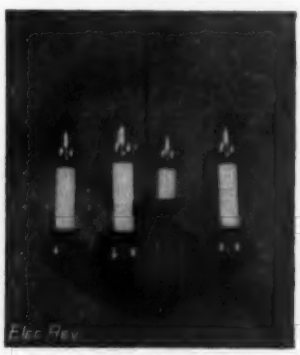
New cornice-lighting strip introduced by the EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, E.C.4, is built up of a number of component parts in the lengths required. Mounted on battens the complete units thus formed can be removed from the cornice for cleaning purposes. The busbars of circular copper rod carry special b.c. porcelain holders to which are fixed heavy-gauge sheet-steel vitreous-enamelled reflectors of circular section embracing about one third of the lamp, thereby controlling light distribution. The reflectors form 6-in., 9-in. and 12-in. distance pieces, and they protect the busbars which terminate at one end in a porcelain terminal block. The only wiring necessary is to the terminal block at the end of the strip, so that the installation cost is reduced to a minimum.



**"Ediswan" three-unit cornice strip**

### Candle Adaptor for Lighting Fittings

SILAS QUAKER, LTD., 110, Park Street, Camden Town, N.W.1, have recently introduced a candle adaptor for use with "Quakerlight" fittings. It consists of a brass gallery finished in Florentine bronze, and it simply clips on to the bracket. It takes the shape of a grease-cup, and gives the necessary finish to the fittings to enable b.c. candle lamps of the "Huntalite" type or "Gothic" candle lamps to be used. The addition of this candle adaptor greatly widens the range of "Quakerlite" fittings. In the "Sunbeam" pendant, ignoring the different colours and shapes of shades, fifteen different combinations are available; if this is multiplied by the number of candle lamps suitable for the fitting, the result gives some idea of the number available.



**"Quakerlite" with candle adaptors and "Huntalite" lamps**

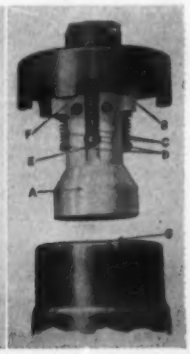
### Electrically Wound Time Switch

In the description in our issue of November 13th, p. 743, of the new ZS 101 electrically wound time switch introduced by SADIA, LTD., 22, Newman Street, Oxford Street, W.1, we referred to the "Sunday" cut-out with which the apparatus is fitted as a novel feature. We are asked by the makers to correct this. It is the provision of the cut-out at no extra cost which is claimed to be novel, not the cut-out itself.

### Workshop Reflectors

The WARDLE ENGINEERING CO., LTD., Old Trafford, Manchester, has introduced for the coming season a new range of "Workslite" reflectors incorporating a new type of housing cap, together with a H.O. skirted porcelain lampholder. The latter is secured to plate B to which are attached three phosphor-bronze vibration absorber springs C seated in cup washers D which in turn are situated in suitable recesses in the three pins E. Felt cushions mounted in the rods above the plate B ensure a flexible seating for the latter, so that vibration-proof mounting is secured, with limited side movement. For wiring the lampholder is pulled down against the pressure of the springs without removal. Should, however, it be necessary to remove it from the housing, this operation is effected by withdrawing the three cup washers D, when the lampholder and springs are removed as a complete unit. When being placed in position the reflector is moved vertically until the rim G presses against the spring plate. With a slight rotary movement it is secured by the engagement of suitable flanges and stops, and is retained in position by a downward pressure of the spring plate. Removal can be effected only by an intentional left-hand rotary movement. The reflector can also be supplied with an earthing screw if required.

**"Workslite" reflector**



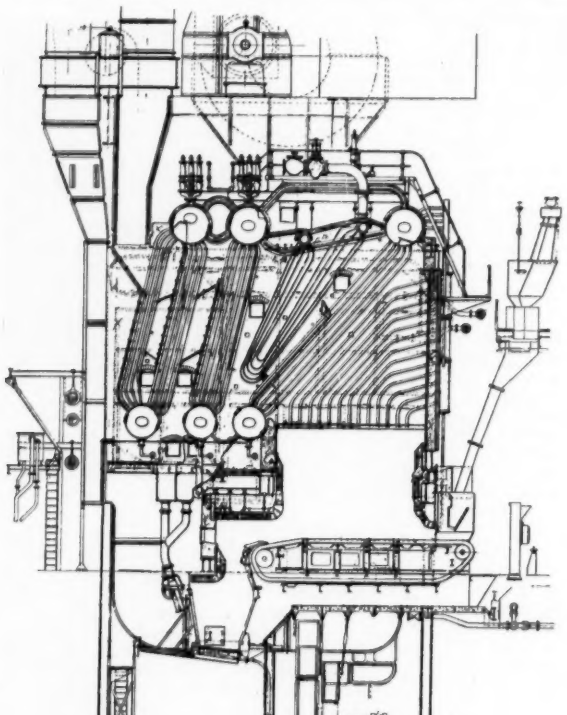
**Construction of holder**

# Progress at Manchester

## New archless boiler at Barton: demonstration room for industrial equipment

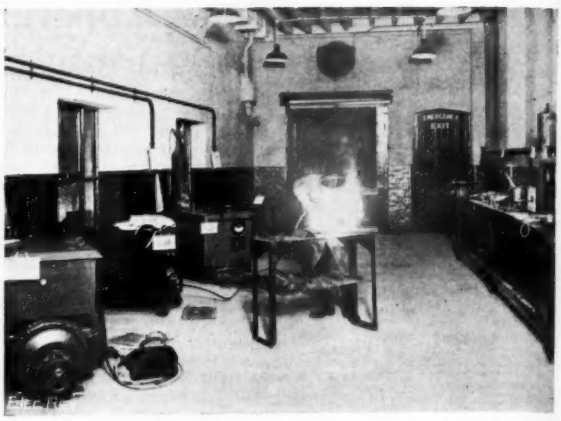
IT was interesting to learn during a recent visit to the Manchester Corporation electricity undertaking that a new 130,000-lb. per hour Thompson boiler unit was near the point of completion at the Barton power station.

An unusual feature of the boiler is that it is archless and has a very high combustion chamber. Secondary air will be admitted above the grate, and Mr. H. C. Lamb, M.I.E.E., chief engineer and manager, and his staff think that this setting will give complete satisfaction. Another outstanding feature is the very tall chimney, about 300 ft. high, or 200 ft. above the top of the boiler house. It is of very heavy steel construction with a concrete lining.



**Construction of new boiler at Barton**

A higher steam temperature will be adopted than is employed with the existing plant—800 deg. F. as against 750 deg. F. It will be recalled that there are two turbine rooms at Barton, and between these a boiler house has been erected.



**Industrial-equipment demonstration room**

No. 4 generating set in the second turbine room is designed to operate at the higher steam temperature of 750 deg. F. at the turbine stop valve.

The grid sub-station at Barton is almost ready for its equipment. It will control five lines, two to Liverpool and Warrington, one to Stockport, one to Agecroft, and one to Kearsley.

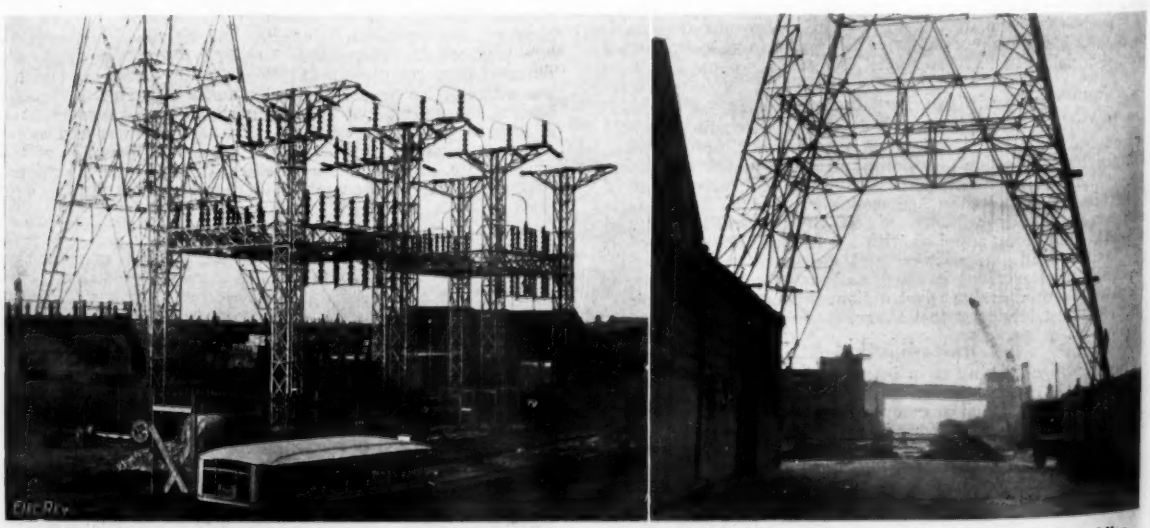
Automatic tap-changing transformers are now being installed in some of the undertaking's 33,000-V "subs" for 33- to 6.6-kV reduction. This has been decided on in preference to installing voltage regulators in numerous smaller sub-stations. At the time of our visit there were on order four 10,000-kVA, two 7,500-kVA, one 6,000-kVA, and one 3,000-kVA transformers of this description. Supervisory control equipment has been installed in four main 33/6.6-kV sub-stations, and a fifth is being similarly equipped. The scheme is being developed so that all main sub-stations will ultimately be controlled from a central station.

### Industrial Demonstrations

Of particular interest at Manchester is a new demonstration room for industrial equipment, which has been opened at Dickinson Street. Manufacturers are invited to exhibit their products in the room, and the undertaking invites interested consumers to witness the demonstrations.

When we visited the room Wild-Barfield Electric Furnaces, Ltd., were staging a demonstration exhibit of several models of their furnaces. Two exhibitions had previously been held, one of welding equipment by the Metropolitan-Vickers Electrical Co., Ltd., and one of steam-raising apparatus by Bastian and Allen, Ltd. Adequate supplies of both a.c. and d.c. are available, and numerous plug points are arranged round the room. In an endeavour to impress upon consumers the importance of earthing, the earth terminals are given considerable prominence. The room is also equipped with a screen for lantern and film displays.

There are now 72,000 consumers connected to the Manchester system, and the domestic load is still growing rapidly. Over 8,000 cookers are now supplied.



**The grid terminal and crossing tower on the east side of the River Yare, which has a base width of 90 ft. by 50 ft. and straddles the road behind the Fish Wharf, near Yarmouth power station. Two legs are on the site of the C.E.B. transforming station. The height overall is 236 ft., and to the lowest conductor 183 ft., giving a clearance from high-water level of 160 ft. The span length to the 245-ft. tower on the west bank is 875 ft.**

# Prague's New Transmitter

## A 200-kW broadcasting station for the Czecho-Slovakian capital

SITUATED some 35 km. east of Prague, in the vicinity of the small town of Cesky-Brod, the Czech Government's new high-power broadcaster is, according to the latest C.C.I.R. rating, a 200-kW station, designed by the International Telephone and Telegraph Laboratories and supplied and installed by the Standard Electric Co., of Prague. The speech-input equipment caters initially for two studios in Prague, with provision for extension to ten studios. It employs two condenser and one carbon microphone in the first studio, and one condenser and one carbon microphone in the second studio; it includes the apparatus for a central announcer and controller, with a possibility of adding gear to introduce echo effects; enables the outputs of the various microphones in the studios to be "mixed"; and provides facilities for taking a programme from a number of outside lines. The whole of this equipment, with the exception of the microphone batteries, is operated from the supply mains by means of dry metal rectifiers and smoothing circuits.

The connection between the radio transmitter and the studio is an underground cable, associated with a two-stage line amplifier fitted with gain control and facilities for the use of a local microphone. An equaliser panel makes the line characteristic as nearly flat as possible between 30 and 10,000 cycles. There is an amplifier panel also for the emergency microphone at the transmitting station.

Modulation is done at low power with subsequent high-frequency amplification. The carrier power is generated by a low-power frequency-controlled master oscillator, which provides the sole drive for a succession of non-regenerative amplifiers.

The crystal-controlled master oscillator drives a neutralised amplifier or first coupling stage. All the following amplifier stages are of the balanced push-pull type which gives practically complete freedom from reaction. The second coupling stage feeds the modulated amplifier, which is followed by three stages of radio-frequency amplification.

The tuning of all the low-power circuits is by variable condensers, and the tappings on the coils are made by soldered connections brought out to screwed terminals. In the final amplifiers tuning is by a short-circuited turn rotating inside each coil. The oscillator-modulator is a complete broadcaster in itself, with a carrier output of 250 W, capable of 100 per cent. distortionless modulation. The apparatus is contained in four separate duralumin boxes, each being self contained and electrically screened from the other portions of the circuit. These boxes are mounted at the back of the slate panels on the front of which are the meters and controls. Each of the boxes is on slides and may be withdrawn bodily without disturbing other circuits.

The crystal oscillator consists of a one-watt valve coupled by a radio-frequency choke to the first coupling stage, which consists of a neutralised 50-W valve acting as an amplifier and working into a tuned circuit. This in turn drives an amplifier consisting of two 50-W valves in push-pull working into a resistance potentiometer, the output of which drives the grids of the modulated amplifier valves.

**The new Prague broadcasting station**

The first radio-frequency amplifier consists of two 500-W valves operated in balanced push-pull at a d.c. anode potential of 5,000 V. The "power amplifier" includes 14 water-cooled valves, each capable of delivering a peak power of 40 kW at 20,000 V, and their associated apparatus.

Each valve is provided with separate meters to indicate the anode and grid currents and an overload relay which opens the circuit breaker should the anode current become excessive.

Filament volt-meters are provided, and to indicate the radio-frequency drive applied to the grids of the amplifier valves a radio-frequency peak voltmeter is built into the unit, the input being permanently connected across the grid circuit while the output is led away to the meter panel and the monitoring desk.

The interstage tuned circuit which couples the second and third radio-frequency amplifiers has coils consisting of "Pyrex" glass formers on which are wound silver-plated copper tube. A short-circuited turn rotates inside each coil.

The third radio-frequency amplifier is capable of delivering without overloading a maximum peak power of 480 kW, corresponding to 100 per cent. modulation of a carrier power of 120 kW. The valves are divided into two groups of six, each group comprising a separate push-pull amplifier.

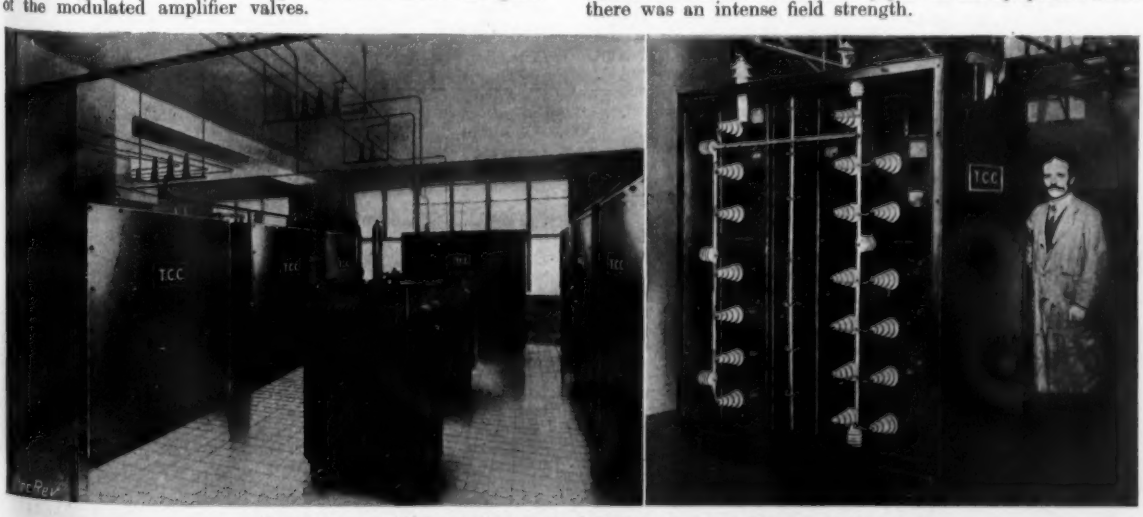
The monitoring connections are such that either visual (by means of a cathode-ray oscillograph) or aural monitoring can be employed.

The aerial towers are 492 ft. high, insulated, and self-supporting; they are spaced 820 ft. apart. The transmitter is housed in a two-storey building of very modern architectural design. It has a copper roof which is connected by copper bus-bars down all four walls to the ground. There is also a copper-mesh screen in the floor of the radio room, so that actually the apparatus is contained within a copper screen.

The majority of the condensers used in the new station have been supplied by the Telegraph Condenser Co., and among them are the smoothing condensers which are rated to work up to 25,000 V d.c. Seven banks were required each having a capacity of 5 mF, the whole being contained in seven tanks. Each 5 mF tank was made up of a number of units of small capacity, each working in parallel. The units are readily accessible after removing the side covers, and the steel tanks are mounted on rollers to facilitate movement on site. The tanks are 6 ft. 6 in. high and are earthed to one side of the condensers. The condenser units were fixed into the tanks in such a manner that they could be transported without need for taking apart and they were tested up to 50,000 V d.c. Paper dielectric was used, surrounded by a filling of wax.

The working conditions required certain condensers to work up to 50,000 V peak value at high frequencies; they have as usual a mica dielectric, and are immersed in oil so that the heat generated in the dielectric may be dissipated.

The larger condensers of this type were built into brass containers and fitted with "Pyrex" or porcelain terminals. Brass was used so that additional heating might be avoided should the condenser rest in any part of the equipment where there was an intense field strength.




**Some of the T.C.C. condensers installed in the new Prague station**

# Business and Industrial Notes

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures**

## The First " Dumping " Order

The Dumping Act, officially termed the Abnormal Importations (Customs Duties) Act, 1931, received the Royal Assent on November 20th, and on the following day particulars were published of the first Order made under the Act by the President of the Board of Trade. This scheduled 23 classes of goods imports of which have recently been in excess of the normal quantities, among them being electric vacuum cleaners and parts and wireless sets and components, including loud speakers and telephone receivers and parts, but not including valves, permanent magnets or batteries. Upon these products a duty of 50 per cent. *ad valorem* is to be charged. The Order came into force on Wednesday last.

## New Works and Extensions

In anticipation of benefits from the introduction of tariffs, MESSRS. H. J. BALDWIN & CO. have acquired further works at Newcastle-upon-Tyne for the manufacture of cable covers. An expenditure of approximately £15,000 has been sanctioned for the erection of the most modern type of kilns, while other new types of machinery will also be immediately installed. By their action Messrs. Baldwin will give immediate employment to many on the Tyneside, and put into practice their desire to assist in every way the " Buy British " campaign. The new works will operate under the style of Baldwin Northern Products, Ltd.

According to the *Daily Telegraph*, MESSRS. FERRANTI, LTD., propose to extend their works at once and expect to double their staff. Prices are not to be increased.

## " Inventum " to Manufacture in England

We are informed by MR. ALAN WRIGHT that arrangements are well advanced for the manufacture of " Inventum Condensacone " water heaters in this country. " Inventum " products have always incorporated a very large proportion of British material, so that manufacture in this country does not present great difficulties. " Condensacone " water heaters have been specially designed to overcome the troubles experienced in hard water districts, and about 200 have now been in operation for about four months with excellent results.

## Buying British Glassware

In the past MESSRS. FREDERICK THOMAS & CO., LTD., have imported all their " Efteelite " glassware from the Continent. On the departure from the Gold Standard the cost of foreign glassware was increased by some 25 per cent., and consequently the company again opened negotiations with British manufacturers. As a result work has now been commenced on moulds for the glassware, and it is expected that British-made units will be in course of production within the next week or two. The British " Efteelites " will be 20 per cent. above the present catalogue prices, and are claimed to be in every way competitive with the foreign product.

## Marking of Imported Insulating Tape

The Board of Trade announces that a draft Order-in-Council has been laid before Parliament requiring imported adhesive insulating tape for electrical purposes to bear an indication of origin on sale or exposure for sale in the United Kingdom. The draft order is being published, and will be available in due course from the Stationery Office.

## Wages in the Cable-making Industry

A rise in the cost-of-living index figure to 46 per cent. will involve an increase in the wages in the electric cable-making industry on the third pay-day in December. The Joint Industrial Council for the industry has sent us a schedule of the rates which will then come into force. The increases in the weekly wages are as follows:—Male time workers, district No. 1, 1s. 11½d., district No. 2, 2s.; youths and boys (18-21), district No. 1, 1s. 5½d., district No. 2, 1s. 6d.; youths and boys (14-17), 4d. to 6d.; women (18 or over), 1s.; and girls, 6d.

## Electric Signs in Cape Town

Commenting on the comparatively few electric signs in Cape Town, Mr. G. H. Swingler, the city electrical engineer, says the reasons for this are lack of encouragement to business firms to install them and the import duty of 20 per cent. He says that some signs could be manufactured in South Africa and for those which cannot the duty should be revised or abandoned.

## Industrial Electric Motors

" If we as a nation attended to business with the same enthusiasm as we follow sport, then all would be well with Britain." . . . " In spite of the industrial depression Higgs Motors are fully employed and erecting further extensions which are necessary owing to the ever-increasing demand," etc. These are the opening and closing sentences of a brochure issued by Messrs. Higgs Motors of Witton, Birmingham, telling the story of the progress of their business and works since the concern was founded in 1912 with the express object of specialising in electric motors for industrial purposes, a policy which has been continued. The literary matter which is brief, but quite sufficient to tell the story, is accompanied by a number of pictures showing the size and capacity of the works to-day in comparison with 1917. The expansion became rapid after the war, and the present signs for the future, with a certainty of greatly increased industrial electrification, are for continued expansion of the company's productivity. The output is limited to industrial electric motors ¼ to 50 h.p., a.c., and d.c., of all types.

## The Contractors' Dinner

Another body which realises that the cancellation of its annual dinner would be false economy is the Electrical Contractors' Association. It has been decided that this function shall take place on January 27th next.

## Successful Compensation Appeal

In the Court of Appeal on November 20th the Master of the Rolls, and the Lords Justices Lawrence and Slesser, had before them the case of Dugdale *v.* Johnson & Phillips, Ltd., which was an appeal by the children of James Dugdale, an electrical linesman, from a decision in favour of the company by the Banbury County Court Judge. Dugdale received an electric shock from a high-tension cable on a terminal pole, and died six days later. The County Court Judge held that the accident did not arise out of Dugdale's employment, and that his children were therefore not entitled to an award under the Workmen's Compensation Act.

The grounds of the appeal were that there was no evidence entitling the Judge to hold that the accident did not arise in the course of the man's employment, and as he had found that the accident happened while the deceased man was acting in contravention of orders given on behalf of his employers, though at the time he was working in connection with his employment, he misdirected himself in law.

The Master of the Rolls, in giving judgment, said that the County Court Judge found that, provided care was taken, there was no danger in the man's job. But here it was clear that the man had not stepped outside the sphere of his employment. As a matter of fact, in law, on the findings of the Judge, he should have directed himself to an award in favour of the applicants. The appeal would therefore be allowed, with costs, and the case sent back for an amount to be awarded.

Lords Justices Lawrence and Slesser agreed, and counsel stated that the amount to be awarded had been agreed between the parties.

## Irish Free State Electrical Imports

The electrical trade of the Irish Free State continues quiet. The imports of machinery and cognate apparatus during September last amounted to a value of £41,801, bringing the total for the first nine months of the year to £483,199, a decrease of £188,483, or over 39 per cent., as compared with the corresponding period of 1930. Details of the nine months' imports are appended:—

| | January—September. 1930. | 1931. |
|---|---|---|
| | £ | £ |
| Electrical machinery .. .. | 222,548 | 138,878 |
| Electric wires and cables .. .. | 128,648 | 70,025 |
| Electric lamps and parts .. .. | 66,244 | 44,277 |
| Radio sets and parts .. .. | 65,570 | 72,928 |
| Other electrical goods .. .. | 154,881 | 142,122 |
| Copper wire .. .. .. .. | 33,791 | 14,969 |
| Totals .. .. .. | £671,682 | £483,199 |

It will be noticed that radio material is again the only item showing an increase.

## Imports of Cinema Equipment

In the House of Commons on November 17th, Mr. Runciman (President of the Board of Trade) said that imports of electrical equipment for use in cinemas were not separately recorded in the trade returns of the United Kingdom, but, according to the official export returns of the United States, the value of the exports of motion-picture sound equipment from that country to the United Kingdom during the first eight months of 1931 was £123,000.

## Social Events

The G.E.C. Dramatic Society gave a very successful presentation of Jevan Brandon-Thomas's comedy, *Passing Brompton Road*, on Thursday, Friday, and Saturday last week at Magnet House, Kingsway. Mr. Ronnie Levenger, except for a tendency in the last act to forget that he was supposed to be deaf, excelled himself as George Harding, while the difficult rôle of Dultitia Sloane was charmingly played by Miss Molly Whelan, who, however, appeared rather young to possess a grown-up family. Miss Vera Musselwhite as Miss Carruthers, and Mr. William Avenall (Henry Sloane) also gave polished performances and were well supported by the other members of the cast, Miss C. Ridler, Miss V. Williams, Miss I. Wills, Mr. S. C. Wells, and Mr. R. Palmer. The producer was Mr. Dudley Pearmain.

Among employés of the General Electric Co., Ltd., Birmingham, amateur dramatics have also reached a high standard, and on November 20th an admirable performance was given at

the Magnet Club, Witton, of the comedy *A Damsel in Distress*.

Covent Garden was the venue on Friday last of the staff dance held by STANDARD TELEPHONES & CABLES, LTD. Dancing was continuous throughout the evening, and although we suppose that everybody forsook the dance floor some time during the evening to renew their energies in the refreshment room, there was no apparent diminution in the large number dancing. Later in the evening the solemnity which modern dances seem to have introduced to the ballroom was quickly dispersed by the introduction of the polka, barn-dance, and military two-step. An enjoyable evening was brought to a close at midnight.

The metamorphosis of the British Engineering Standards Association into the BRITISH STANDARDS INSTITUTION was unofficially celebrated by the staff of the Institution by a dance at Lysbeth Hall, Soho Square, on November 17th. About 120 were present, and Mr. J. F. Stanley acted as M.C. The event was so successful that another dance will probably be held in the New Year.

## Dutch Radio and Lamp Exports

During October the exports of radio apparatus from Holland showed an increase over the previous month both in weight and value, but they were less than in the corresponding month of last year. For the ten months ended October the weight of the exports amounted to 6,637 metric tons of the value of 37,150,000 fl., as compared with 8,235 tons of the value of 51,492,000 fl. in the corresponding period in 1930. Similarly there was a falling off in the exports of metal filament lamps. The number exported in the first ten months of this year is returned at 24,569,100, as against 41,753,100 in the corresponding period of last year, the values being 11,291,000 fl. and 19,381,000 fl. respectively.

## Permanent Illuminations at Bournemouth

An interesting sea front lighting scheme has recently been carried out at Bournemouth by the Bournemouth Corporation and the REVO ELECTRIC CO., LTD. The whole of the piers at Bournemouth (shown on this page) and Boscombe present a very striking picture with their 2,000 natural coloured glass lamps of ruby, amber, green and blue. As such a system is

**"Revo" fittings on Bournemouth Pier Head**

very exposed to bad weather special drainage channels have been provided beneath each vital point of the system. The Pavilion Gardens and the Overstrand Café Gardens at Boscombe are also illuminated by special "Revo" fittings specially galvanised to resist climatic conditions and to enable them to retain their clean appearance without much attention.

## Model Flats at Somers Town

To replace slums in Bridgewater Street, Somers Town, a new block of flats was opened recently by Princess Helena Victoria. The new flats are equipped with electric cookers, coppers, water heaters and lighting, and every precaution has been taken to prevent the recurrence of insanitary conditions. At the opening ceremony a portion of the estate was floodlighted by the EDISON SWAN ELECTRIC CO., LTD., a number of large projectors being installed in one of the sunken gardens.

## Callender's Police Force

Law and order has to be maintained and there are times when the City police welcome the co-operation of the City

**The Callender Police**

of London Police Reserve. Callender's Cable & Construction Co., Ltd., have formed a company for this purpose. The accompanying illustration shows "P" company on parade, with Mr. H. Foulds (secretary of Callender's) in the centre.

## Employment During October

The November *Ministry of Labour Gazette* states that employment in the engineering industry during October continued bad; electrical engineering remained slack with little change. The number of unemployed in the engineering industry as a whole at October 26th was 272,926, representing a proportion of 27.2 per cent. (against 28.1 per cent. in September). In the electrical section the figure was 14.9 per cent., as compared with 15 per cent., the total being 13,803. There was a further slight decrease (from 13.9 to 13.5 per cent.) in the number of unemployed in the electric cable, wire and lamp manufacturing group, the total being 14,573, while in the electrical wiring and contracting industry the total of 3,461 represented a decrease from 15.7 to 15.4 per cent.

## Australian Electrical Imports

The value of imports of electrical machinery and apparatus into Australia during July last amounted to £112,197, as compared with £387,788 in the corresponding month of 1930.

## The E.D.A. December Programme

The programme of the British Electrical Development Association is a special Christmas number and it contains a great deal in the way of assistance to the retailer of electrical appliances suitable as gifts. Stereos have been made for local advertisements, and the Association is advertising the "Electrical Gift Xmas" nationally in newspapers and journals throughout the country. The posters and literature for the month also relate to the festive season. A special series of Christmas window displays have been prepared, four of which are illustrated in the programme, in addition to the display for November. Two of these layouts are shown in the accompanying illustrations. The designs have been kept as simple as possible in order that the smallest showroom can adopt them, while for the benefit of those who do not require a complete display the Association is making available, separately, the various window dressing fittings.

Early in the New Year a number of new posters dealing with lighting, domestic cookery and industrial power will be

**Two of the E.D.A. Christmas window displays**

produced while in the course of the next few weeks the Association is issuing a 16-sheet poster (80 by 120 in.) dealing with electric cooking. This will be the first poster of this size the Association has produced, and if the experiment is successful, further posters in 16-sheet or larger sizes will be issued.

### Italian Lamp Production

The number of electric lamps produced in Italy during June last amounted to 1,660,437, bringing the total for the first six months of the year to 11,136,270, as compared with 12,160,705 in the corresponding period of last year.

### Submarine Cable Manufacture in Japan

The Tokyo correspondent of the *Far Eastern Review* reports that the Japanese Government has considered the manufacture of submarine cables in Japan for many years. It is now said to have succeeded in arranging with the Sumitomo Electric Wire Works for the manufacture of such cables. The Sumitomo firm will establish a factory for the purpose somewhere in the Bay of Osaka, and at first gutta-percha cables will be made by the factory, which will commence work at the end of 1932 or the beginning of 1933.

### Electrical Imports of Bermuda

The imports of electrical goods into Bermuda during 1930 reached a value of £52,645.

### Works Visit

On November 13th the Stratford factory of the HART ACCUMULATOR CO., LTD., was inspected by a party of students from East London College, to whom the various processes of accumulator manufacture were shown.

### The Bulgarian Radio Market

The Department of Overseas Trade has received a confidential report on the market for radio apparatus in Bulgaria, prepared by H.M. Consul at Sofia. This states that notwithstanding the continued absence of a local broadcasting station, the market for receivers is gradually expanding. Apart from the material benefits which would accrue, a British-made receiver on this market is desirable from the point of view of British economic propaganda generally. The general features of requirements have not undergone any radical change, and the demand for multi-valve sets should not diminish even when the Sofia station comes into being, as, should the power be 15 kW, as proposed, reception in the provinces will necessitate the use of three valves. American sets are now appearing on the market in increasing numbers and are competing with "Philips" and "Telefunken" sets, which up to now have held about 50 per cent. and 30 per cent. of the total trade respectively. The demand for component parts, although small, is increasing, the larger portion being imported from Germany and Austria. The desire for cheap parts of poor quality is passing, and a good average quality is now in demand.

### More "Ediswan" Floodlighting

A further example of successful floodlight was to be seen at Bourneville on the occasion of the recent centenary celebrations held there by Messrs. Cadbury. The illuminations were carried out by the EDISON SWAN ELECTRIC CO., LTD., which has also recently installed floodlighting equipment at the "Tarpot" at Thundersley, Essex.

### Hints for Commercial Visitors

The latest addition to "Hints for Commercial Visitors" series issued by the Department of Overseas Trade relates to Palestine (Ref. C. 3706). This contains the usual information of value to visitors on business.

### Price Reductions

DIMMERS (1926) have reduced the prices of their "Lowa" theatre and cinema dimmers (type "S").

### New Electrical Showrooms

The St. Pancras Borough Council Electricity Committee proposes to rent shops on the Camden Road Estate for showrooms for the undertaking.

New offices have also been opened by the Okehampton Electric Supply Co. at 5, Stratton Road, Okehampton.

### The Levant Fair

The fifth Palestine and Near East Exhibition and Fair—the Levant Fair—is to be held at Tel-Aviv next year from April 7th to 30th.

### For Sale

Knitted Garments, Ltd., offer for sale motors, generators, starters, distribution boards, and other electrical equipment.

(See our advertisement pages to-day.)

### An International Electrical Company in Spain

The Sociedad Geathom is the title of the company which has lately been formed in Madrid with a capital of twenty million pesetas under the joint auspices of the A.E.G. Iberica de Electricidad, the Sociedad Iberica de Construcciones Electricas, the A.E.G. Co., Berlin, the Als-Thom Co. of Paris, the Compagnie Française Thomson-Houston, and the International General Electric Co. of New York. The purpose of the new undertaking is to establish large works for the construction of electrical machinery in Spain in association with the interested concerns.

### Electric Fire Prices Reduced

The EDISON SWAN ELECTRIC CO., LTD., notifies us of a number of reductions which it has made in the prices of its electric fires.

### Trade Announcements

The new telephone number of the branch office and stores of the ELECTRICAL EQUIPMENT & CARBON CO., LTD., 71, Parliament Street, Nottingham, is "Nottingham 2920."

MR. E. H. LEAF informs us the business of electrical engineers hitherto carried on as "H. M. Leaf" at 47, Victoria Street, Westminster, S.W.1, will in future be known as "Leaf and Carver."

A new wholesale stores depôt has been opened by the GENERAL ELECTRIC CO., LTD., at 516, London Road, Croydon, under the managership of Mr. F. H. Forrester. The telephone number is Thornton Heath 3246.

The address of THORPE & THORPE, LTD. (see last issue, p. 792) is Vincent House, Vincent Square, S.W.1.

MESSRS. J. GLEDSON & CO., LTD., inform us that the fire which recently gutted the offices on the ground floor and part of the warehouse at its establishment at 48-50, Blackett Street, Newcastle-upon-Tyne, did not touch the stock, and orders will therefore be dealt with as usual. They ask for new catalogues, etc., from manufacturers to replace those which were destroyed.

Messrs. JOHN KELLY & SONS, of 9, Portland Street, Troon, Ayrshire, have opened an electrical department, and they ask for catalogues and price lists of radio goods and material for lighting, heating and power installations. Mr. K. W. Cairney, who carried on an electrical business in Troon for many years, has joined their staff.

### Recent Contracts

BATTERIES, LTD., have recently received a large contract for "Nife" nickel cadmium alkaline batteries for mining electric locomotives for service in Russia. The contract covers twenty-three batteries of various capacities and voltages as follows: Five batteries each consisting of ninety-six cells having a capacity of 370 Ah.; nine batteries each consisting of eighty cells having a capacity of 370 Ah.; and nine batteries each consisting of 108 cells having a capacity of 425 Ah.

STANDARD TELEPHONES AND CABLES, LTD., have received an order for 100 two-wire repeater panels for Oslo, Norway. Another order received by the company is from the General Post Office for an extension to Catterick repeater station.

The BRITISH THOMSON-HOUSTON CO., LTD., has received a contract from the Booth Steamship Co. for a supply of electric lamps for one year.

The Jutland Co-operative Provender Supply Association of Copenhagen has placed an order with Messrs. HENRY SIMON, LTD., for a travelling pneumatic grain discharging plant with a capacity of 120 tons per hour. The pneumatic plant will be mounted on a travelling tower which will span three lines of railtrack on the quay side, and will be provided with a cantilever conveyor gantry which will reach out across the quay to the granary building. "Simon" reciprocating vacuum pumps will be installed, driven by electric motors, to be supplied by the Danish company.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., has received an order for an exhaust turbo-electric auxiliary drive for a new vessel being built by Messrs. Workman Clarke for the Standard Fruit and Steamships Corporation of New Orleans. The auxiliary drive is designed to deliver 1,560 s.h.p. to the propeller at 90 r.p.m., and the turbo-alternator will in addition supply a general ship load of about 170 kW. Considerable advantage will be gained by the installation of the exhaust turbo-electric drive, as the vessel will be able to save twenty-four hours in a journey from the West Indies to this country, whilst only consuming the same fuel as other ships of the same size trading on this route.

**Cradled motor in the roving room of the Whetley Mill**
(*see p.* 805)

## New Catalogues and Lists

**Rhodes, Brydon & Youatt, Ltd.,** Gorsey Mount Street, Stockport.—Publication No. 124, relating to the "Fullway Mopump."

**Tungsram Electric Lamp Works (Gt. Britain), Ltd.,** 72, Oxford Street, W.1.—A leaflet giving prices and particulars of the company's lamps.

**Igranic Electric Co., Ltd.,** 149, Queen Victoria Street, E.C.4.—Leaflets relating to battery charging equipment (No. 780), inductive time-limit control (No. 6745), phase failure protective relays (No. 450/102), and a.c. plugging relays (No. 450/109).

**Consett Iron Co., Ltd.,** Consett, Co. Durham.—A brochure describing "Bearco" copper-bearing steel.

**W. J. Furse & Co., Ltd.,** Traffic Street, Nottingham.—A series of handsome pamphlets giving details of electrical installations carried out by the company in a number of well-known buildings, etc.

**Edison Swan Electric Co., Ltd.,** 123-5, Queen Victoria Street, E.C.4.—Catalogues of "Ediswan" commercial lighting fittings (C.L. 708), "X-ray" reflectors (C.L. 709), and radio receivers and apparatus (R. 712).

**Drayton Regulator & Instrument Co., Ltd.,** West Drayton, Middlesex.—An illustrated leaflet relating to a mixing valve for thermal-storage systems with dual-control for day periods and night and week-end periods.

**Standard Telephones & Cables, Ltd.,** Connaught House, Aldwych, W.C.2.—A folder on radio receivers for light aircraft.

**Holophane, Ltd.,** Elverton Street, Vincent Square, S.W.1.—A brochure illustrating some of the principal buildings floodlighted by the company on the occasion of the International Illumination Congress.

**H. G. Moseley & Co., Ltd.,** Hospital Street, Birmingham.—A leaflet describing a new "Eddo" aluminium immersion-type electric kettle.

**Insulators, Ltd.,** Montague Road, Edmonton, N.18.—Particulars of advertising novelties in bakelite.

**British Thomson-Houston Co., Ltd., Rugby.**—A number of leaflets dealing with control and switch gear, traction motors, etc.

**Alan Wright,** 117, Victoria Street, S.W.1.—List No. A.S. 1/31, giving particulars of the "Inventum Condensacone" automatic electric water heaters.

**Kent Dish Washing Machine Co., Ltd.,** 3, The Priory, Tunbridge Wells.—A description, with technical data, of the company's dish-washing machine.

**Selas Gas & Engineering Co., Ltd.,** City Road, Manchester.—Catalogue No. 32, relating to "Lava" insulating material.

## Bankruptcy Proceedings

**F. E. Saunders,** electrical engineer, 10a, Page Street, Westminster, S.W.—This debtor attended on November 24th before Mr. Registrar Mellor at the London Bankruptcy Court for public examination upon accounts showing liabilities of £1,701 against assets of £668. Debtor attributed his insolvency to bad trade and loss on trading, to insufficient profits to meet his drawings and expenses, to the withdrawal (in consequence of a breach by him) by the London County Council of contracts which he had entered into for the execution of work on two of the Council's housing estates and to the fact that the Council exercised its right under the contracts to complete the work and in the meantime to hold retention money, stock and tools on the sites, and the amount falling due on accounts for work done up to that date. The examination was concluded. The following are creditors :—

| | £ | | £ |
|---|---|---|---|
| Baxter & Caunter ... ... | 975 | Campbell, G. ... ... ... | 55 |
| Kennedy, T. A. ... ... | 110 | Flockton, Mrs. ... ... | 50 |
| Barclays Bank ... ... | 81 | General Elec. Co. ... ... | 48 |
| Edison Swan Co., Ltd. ... | 71 | Stevens, R. ... ... ... | 40 |
| Pike, F. A. ... ... ... | 60 | National Provincial Bank | 32 |

**Jessie M. Kelly** (trading as the Norton Electric Co.), wireless mfr., 17, Norton Folgate, E.C.—The public examination was held on November 20th before Mr. Registrar Mellor at the London Bankruptcy Court, the accounts showing liabilities of £323, against assets of £6. The debtor attributed her insolvency to keen competition and to the gross profits having been insufficient to cover overhead charges and drawings. She was questioned at some length regarding the actual proprietorship of the business and denied that she had ever held out to creditors that the business belonged to her husband and herself. The examination was concluded.

**W. J. Lattimer,** 1, St. James Park, Croydon, lately trading as W. J. Lattimer & Co., 52, High Street, Croydon, electrical engineer.—This debtor applied for his discharge recently at the County Court, Croydon, when it was stated that the receiving order was made on a creditor's petition in September, 1925. The ranking liabilities were estimated at £284, but proofs lodged totalled £205, and probable claims not yet lodged amounted to £391. The assets, which consisted of the stock in trade, estimated at £10, were stated to have no realisable value. Debtor attributed his failure to "lack of capital, under-estimating the cost of contracts, and insufficient business." The discharge was granted subject to six months' suspension.

**H. A. Wileman** (A. Wileman & Co.), electrical engineers and contractors, 141, Commercial Street, Maesteg, Glam.—Last day for receiving proofs for dividend, December 5th. Trustee, Mr. A. J. Rogers, Government Buildings, St. Mary's Street, Swansea.

**P. W. Ottoway** (The Victor Radio Supplies), wireless dealer, 73, Victor Street, Great Grimsby.—Last day for receiving proofs for dividend, December 5th. Trustee, Mr. J. F. Wintringham, St. Mary's Chambers, Great Grimsby.

**H. Roberts,** electrical engineer and contractor, 41, Bloxcidge Street, Langley, Oldbury.—Last day for receiving proofs for dividend, December 7th. Trustee, Mr. C. Hoult, 191, Corporation Street, Birmingham, Official Receiver.

**G. Adamson,** electrical engineer, Royal Station Hotel Yard, Carnforth.—First and final dividend of 2s. 3½d. in the £, payable November 24th at the Official Receiver's office, 9, Cannon Street, Preston.

**E. Ball,** electrical contractor, Old Hall Street, Middleton.—Trustee, Mr. A. H. Ward, Byrom Street, Manchester, Official Receiver, released October 16th.

**A. P. Goddard,** electrician, 25, Silver Street, Doncaster.—Trustee, Mr. L. J. Clegg, 14, Figtree Lane, Sheffield, Official Receiver, released October 19th.

**R. E. Young,** wireless and electrical engineer, 8, Manchester Road, Swindon.—Trustee, Mr. J. W. Pridham, 38, Regent Circus, Swindon, Official Receiver, released October 14th.

## Company Liquidations

**Adey Radio, Ltd.,** 99, Mortimer Street, Regent Street, W.—The accounts filed under the compulsory liquidation of this company show liabilities of £1,985, assets "nil," and an issued capital of two ordinary shares of 5s. each. Mr. H. P. Naunton, Official Receiver (liquidator), reports that the company was registered in January, 1929, for the purpose of carrying on the business of manufacturers and dealers in portable wireless sets. An agreement was entered into for the company to purchase two patents from H. W. Adey, and to take over the leases of a factory and showrooms. The consideration was to be £14,000, payable in cash and shares, but, owing to disagreement between the directors, the purchase agreement was not adopted by the company. The business carried on was the manufacture and sale of portable wireless sets of Adey's design, but the company does not appear to have transacted any substantial business, and has made trading losses since its inception. Mr. Adey attributes the failure of the company to bad trade.

**South Staffordshire Tramways (Lessee) Co., Ltd.**—Meeting, December 21st, at 88, Kingsway, W.C., to receive an account of the winding-up by the liquidators, Mr. R. P. Beddow and Mr. T. H. Underhill.

**Edibell Sound Film Apparatus, Ltd.**—Particulars of claims by December 31st to the liquidator, Mr. E. Norton, Thames House, Queen Street Place, E.C.

**Burndept Wireless (1928), Ltd.**—Particulars of claims by December 31st to the liquidator, Mr. E. Maloney, 11, Ironmonger Lane, E.C.

**N.E.S. (Bradford), Ltd.**—Particulars of claims by December 31st to the liquidator, Mr. W. Hustwick, 70, Kirkgate, Bradford.

**Pelican Electric, Ltd.**—Meeting, December 23rd, at 94, Old Broad Street, E.C., to receive an account of the winding-up by the liquidator, Mr. J. J. Reid.

**Faringdon Electricity Supply Co., Ltd.**—Winding up voluntarily. Liquidator, Mr. H. Fraser.

## Winding-up Order

**Halcyon Wireless Co., Ltd.**—In the Companies Winding-up Court, Chancery Division, on Monday, Mr. Justice Eve made the usual order for compulsory winding up of the company.

## Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

| | CHEMICALS, Etc. | Price Nov. 25th. | Fortnight's Inc. or Dec. |
|---|---|---|---|
| *a* | Acid, Oxalic ... per lb. | 5½d. | — |
| *a* | Ammoniac, Sal ... per ton | £60 | — |
| *a* | Ammonia, Muriate (large crystal) ... ,, | £52 | — |
| *a* | Borax ... ,, | £17 | — |
| *a* | Copper Sulphate ... ,, | £25 10s. | — |
| *a* | Potash, Chlorate ... per lb. | 3d. to 4d. | — |
| *a* | ,, Perchlorate ... ,, | 5½d. | — |
| *a* | Shellac T.N. ... per cwt. | £4 5s. | — |
| *a* | Sulphur Commercial ... ,, | £11 | — |
| *a* | ,, Roll ... ,, | £11 | — |
| *a* | Soda, Chlorate ... per lb. | 3d. | — |
| *a* | ,, Crystals ... per ton | £5 to £5 5s. | — |
| *a* | Sodium Bichromate, casks ... per lb. | 3½d. | — |
| | **METALS, Etc.** | | |
| *b* | Aluminium, Ingots ... per ton | £95 to £100 | — |
| *b* | ,, Wire ... per lb. | 1/1 to 1/9 | — |
| *b* | ,, Sheet and Foil ... ,, | 1/1 to 2/9 | — |
| *b* | Babbitts Metal and Anti-friction Metals— | | |
| | Grade I ... per ton net | £129 | £1 dec. |
| | Grade II ... ,, | £92 | £3 dec. |
| | Grade III ... ,, | £52 | £1 dec. |
| *c* | Brass (rolled metal 2" to 12" basis) ... per lb. | 7¾d. | ¼d. dec. |
| *c* | ,, Tubes (solid drawn) ... ,, | 9¼d. | ¼d. dec. |
| *c* | ,, Wire, basis ... ,, | 8d. | ¼d. dec. |
| *c* | Copper Tubes (solid drawn) ... ,, | 10¼d. | ¼d. dec. |
| *g* | ,, Bars (best selected) ... per ton | £70 | |
| *g* | ,, Sheet ... ,, | £70 | £2 dec. |
| *g* | ,, Rod ... ,, | £70 | |
| *d* | ,, (Electrolytic) Bars ... ,, | nom. | — |
| *d* | ,, ,, Sheets ... ,, | nom. | — |
| *d* | ,, ,, Wire Rods ... ,, | nom. | — |
| *d* | ,, ,, H.C. Wire ... per lb. | 6⅝d. | ⅛d. dec. |
| *f* | Ebonite Rod ... ,, | 1/3 to 1/6 | — |
| *f* | ,, Sheet ... ,, | 1/3 to 1/6 | — |
| *a* | German Silver Wire ... ,, | 2/2 | — |
| *h* | Gutta-percha, fine ... ,, | nom. | — |
| *h* | India-rubber, Para fine ... ,, | 3¼d. | — |
| *i* | Iron, Pig (Cleveland No. 3) ... per ton | 58/6 | — |
| *l* | ,, Wire, galve. No. 1, P.O. qual. ,, | £20 | — |
| *g* | Lead, English pig ... per ton | £16 5s. | 5s. dec. |
| *g* | Mercury ... per bot. | £17 10s. | £2 5s. dec. |
| *e* | Mica (in original cases) small ... per lb. | 6d. to 3/6 | — |
| *e* | ,, ,, medium ... ,, | 4/- to 8/- | — |
| *e* | ,, ,, large ... ,, | 8/6 to 17/6 & up | — |
| *p* | Phosphor Bronze, plain castings ... ,, | 1/1½d. | — |
| *p* | ,, ,, drawn bars & rods ,, | 11½d. | ½d. dec. |
| *p* | ,, ,, rolled strip & sheet ,, | 11½d. | ½d. dec. |
| *p* | ,, ,, wire ... ,, | 1s. 0½d. | ½d. dec. |
| *o* | Platinum ... per oz. | £10 8s. 6d. | 4s. 6d. inc. |
| *d* | Silicium Bronze Wire ... per lb. | 8½d. | ½d. dec. |
| *r* | Steel, magnet, in bars ... ,, | 7¾d. | — |
| *g* | Tin, Block (English) ... per ton | £137 to £139 | £1 inc. |
| *n* | ,, Wire, Nos. 1 to 16 ... per lb. | 3/1 | 2d. inc |

Quotations supplied by :—

*a* G. Boor & Co.
*b* The British Aluminium Co., Ltd.
*c* Thos. Bolton & Sons, Ltd.
*d* Frederick Smith & Co.
*e* F. Wiggins & Sons.
*f* India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
*g* James & Shakespeare.
*h* Edward Till & Co.
*i* Bolling & Lowe.
*l* Richard Johnson & Nephew, Ltd.
*n* P. Ormiston & Sons.
*o* Johnson, Matthey & Co.
*p* C. Clifford & Son, Ltd.
*r* W. F. Dennis & Co.

# Electricity Supply

## Lighting, Domestic, Power

**Annfield Plain (Durham).**—LOANS.—The Urban District Council is applying for sanction to loans of £2,000 for the wiring of consumers' premises and £1,000 for services.

INCREASED DISCOUNT.—Discount for prompt payment is to be increased from 5 to 10 per cent. for ordinary consumers, from 5 and 10 per cent. to 10 and 15 per cent. for prepayment consumers, and to 5 per cent. for domestic tariff consumers.

**Australia.**—EXTENSIONS AT NYMBOIDA.—The Commonwealth Bank Board has agreed to a credit of £191,000 to the Clarence River County Council towards the extension of the Nymboida power plant.

CHARGES IN VICTORIA.—With the letter appearing in our correspondence columns this week the secretary of the State Electricity Commission of Victoria sends us copies of the two schedules of charges now in operation in the State. Under Schedule No. 1 there is a domestic tariff of 1s. per living room (*i.e.*, each 350 sq. ft.) per month (minimum 4s.) payable quarterly in advance, plus 1½d. per kWh consumed; no charge is made for meters. Among other tariffs under this schedule are: Water heating: Fixed and only charge of 3s. 9d. per month for every 100 W of element in continuous service (no meter rent). Lighting (block rate): Up to 500 kWh per month, 5½d. per kWh; above, 3d. Power and heating (block): Sliding scale from 2d. to 0.8d. Power and heating (maximum demand): 17s. per kW of maximum demand, plus 0.3d. per kWh. The charges under Schedule No. 2 are:—Domestic tariff: 1s. 3d. per living room (minimum 5s.), plus 1½d. per kWh. Water heating: 5s. 6d. per month per 100 W of element. Commercial and industrial lighting supplies: 9d. per kWh, with graduated discounts according to consumption. Power and heating: Fixed charge of from 5s. to 3s. 6d. per month per h.p. installed, plus 1d. per kWh.

**Bangor (North Wales).**—CHEAPER ELECTRICITY.—Reduced charges representing a concession to consumers of £1,352 per annum, have been approved by the Electricity Committee. The lighting flat rate is reduced by ½d. per kWh for the first 1,000 kWh, prepayment meter rents are abolished, and power rates lowered by ½d. per kWh for consumption over 2,000 kWh per quarter.

**Barnard Castle.**—ELECTRICAL EXTENSION SCHEMES.—A scheme has been prepared by the Rural District Council for an electricity supply to be taken through Lartington, Cotherstone, Romaldkirk, with a branch line to Eggleston, Mickleton and Middleton, and thence to the far end of the dale to the quarries. The Cleveland and Durham County Electric Power Co. has also decided to erect overhead lines from Barnard Castle to Whorlton, and to take a supply to Cockfield.

**Barnsley.**—YEAR'S WORKING.—In spite of the cessation of the supply to the Yorkshire Traction Co., Ltd., in August, 1930, owing to the abandonment of the tramways, there was an increase from 11,133,196 to 11,142,864 kWh in the electricity sold by the Corporation Electricity Department during the year ended March 31st last. New consumers numbered 711, bringing the total to 7,995, while the number of premises connected under the scheme for the wiring of cottage property was 1,975 at the end of the year.

**Barnstaple.**—ELECTRICAL DEVELOPMENT SCHEME.—The Town Council is considering a £16,500 scheme for the further development of the municipal electricity undertaking. It is proposed that the remaining steam plant at the power station should be replaced by new plant at the earliest opportunity, and that the following revised charges for electricity should be put into force in March next:—Lighting (ordinary consumers): 8d. per kWh. Power (other than heating or cooking or special contracts): First 200 kWh per quarter, 4d. per kWh; next 350 kWh 3d.; next 450 kWh 2d.

**Bedford.**—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to a loan of £2,156 in connection with the supply to Hoghton Conquest and Cardington.

**Blackpool.**—PRICE REDUCTIONS.—The Corporation Electricity Committee is to make the following reductions in the charges for electricity as from January 1st next:—"All-in" tariff: "Unit" charge reduced from ¾d. to ½d. Two-part tariff: "Unit" charge reduced from ¾d. to 0.62d. Signs tariff: From 3d. to 2½d. per kWh.

NEXT YEAR'S ILLUMINATIONS.—It is proposed to hold the annual illuminations next year from September 24th to October 24th.

**Bradford.**—EXTENSIONS.—The Corporation Electricity Committee is to give supplies of electricity to the Low Moor Iron Foundry, the Marshfield Dyeing Co., Ltd., and several houses at a total cost of £4,805.

**Bury St. Edmunds.**—REVISED POWER TARIFFS.—The Town Council has adopted the following revised tariffs for power:—First 1,000 kWh per quarter, 2.6d. per kWh; second 1,000 kWh, 2d.; third 1,000 kWh, 1.75d.; fourth 1,000 kWh, 1.6d.; beyond, 1.5d. The charge for electricity for exhibitions will be 3½d. per kWh.

**Cheltenham.**—MAINS EXTENSION.—The Electricity Committee is to extend mains at a cost of £624 to supply the Swindon Lane area.

STANDARDISATION OF FREQUENCY.—The Committee has agreed to accept the conditions of the Central Electricity Board for a financial contribution towards the cost of standardising the frequency.

**Cockfield (Durham).**—STREET LIGHTING.—The Parish Council is to carry out a scheme for lighting the streets by electricity. Mr. E. C. Lennox, Carliol House, Newcastle-on-Tyne, is engineer, and contractors are being asked to submit tenders.

**Colchester.**—PURCHASE OF WALTON-ON-THE-NAZE UNDERTAKING.—The City Council has received sanction to a loan of £22,250 in connection with the acquisition of the Walton-on-the-Naze electricity undertaking.

**Cramlington (Northumberland).**—PLANT FOR CO-OPERATIVE SOCIETY.—A proposal to install generating plant at its central premises at a cost of £1,600 is being considered by the Cramlington District Co-operative Society.

**Croydon.**—EXTENSIONS.—The Corporation Electricity Committee is arranging to provide supplies of electricity to the Waddon housing estate, at a cost of £6,562, and to the Waddon gasworks at a cost of £4,764.

CHANGE-OVER.—The Corporation Electricity Committee recommends a further vote of £2,500 for changing over the supply from 200 to 230 V. It is proposed to install service autotransformers in premises where new consumers are installing a large amount of apparatus, thus effecting a considerable saving when the change-over is made.

**Derbyshire.**—SPECIAL ORDER.—The Derbyshire and Nottinghamshire Electric Power Co. has applied to the Electricity Commissioners for a Special Order authorising it to supply electricity in the urban district of Clay Cross, and in various parishes in the rural districts of Blackwell and Chesterfield.

**Federated Malay States.**—ELECTRICITY SUPPLY IN 1930.—In his annual report on the operation of the F.M.S. Electrical Board, Mr. D. M. W. Hutchison, acting director, states that the total capacity of plant installed in the Federated Malay States at the end of 1930 was 116,689 kW, an increase of 41,264 kW compared with 1929. Energy generated amounted to 219,276,661 kWh (198,761,828 kWh in 1929), of which 27,887,177 kWh was generated by Government undertakings, 71,791,818 kWh by public supply companies and private companies giving bulk supplies under licence, and 119,597,666 kWh by private plants for use in mining. The total revenue of the Government Electricity Supply Department was £291,016, as compared with £266,079 in the preceding year, while the working expenditure increased from £132,421 to £159,724. There was a net profit of £24,175, as against £42,624.

**Fleetwood.**—CONNECTION WITH GRID.—The Urban District Council's undertaking was connected last week with the grid and a supply is now being taken from the Ribble station at Preston. Blackpool, Lytham St. Anne's, and Thornton have been supplied from the grid for some time and four 22,000-V cables have been constructed from Preston to a new switching station at Peel, near Blackpool. From Peel two lines are taken to Blackpool, two to St. Annes, and two to Fleetwood, while two other cables run direct from Preston and Blackpool. The duplicate lines in each case are a precaution against breakdowns. It is proposed to close down the Fleetwood plant in the summer and only use it as an auxiliary means of supply in the winter. Eventually it will be closed down altogether.

**Great Yarmouth.**—LOANS.—The Town Council has received sanction to a loan of £3,046, part of £35,000 applied for, for electricity purposes. Sanction to borrow £3,281, excess expenditure on the new coal-handling plant, is also being sought.

**Hull.**—SUB-STATION EQUIPMENT.—The Corporation Electricity Committee has obtained sanction to a loan of £10,250 for sub-station equipment.

**King's Lynn.**—YEAR'S WORKING.—The accounts of the Corporation Electricity Department (engineer: Mr. C. W. Jackson) for the twelve months ended March 31st last show a total revenue of £34,844, a working expenditure of £17,730, and a net profit of £4,217. The figures for the preceding year were: Income, £30,416; working expenses, £16,186; net profit, £4,108. During the year the capital expenditure amounted to £8,099, making a total of £206,625 now spent on the undertaking. Electrical energy sold increased from 3,130,210 to 3,786,828 kWh, and the maximum supply demanded from 1,780 to 2,020 kW. The average price obtained per kWh fell from 2.04d. to 1.93d. New consumers numbered 517, bringing the total now connected to 4,496.

**London.**—POPLAR.—The Borough Council Electricity Committee has obtained sanction to borrow £4,224 for mains and £1,780 for plant and building work.

HAMMERSMITH.—The Borough Council Electricity Committee recommends that prepayment supply charges, including the hire of lighting installations under the assisted wiring scheme, be restricted to installations comprising not more than six lighting points.

Sanction has been received to loans of £1,400 for sub-station buildings, £23,884 for mains and services, and £433 for sub-station equipment. Mains extensions are to be carried out to Old Oak Common Lane at a cost of £949.

BATTERSEA.—The Borough Council Electricity Committee is to provide electricity services in 399 premises at a cost of

£3,525; extend mains (£691); and replace old vulcanised-bitumen distributors with modern cable (£6,404).

ST. PANCRAS.—Mains extensions costing £1,303 are to be carried out by the Borough Council Electricity Committee.

Sanction has been received to loans of £6,637 for services, £3,433 for meters, £6,620 for house wiring installations, and £3,898 for domestic electrical appliances.

STOKE NEWINGTON.—The Borough Council Electricity Committee recommends an electrical extension scheme costing £19,779 for the Finsbury Park, High Street, and Edward's Lane districts. Mains extensions, costing £478, in Cressington Road, and Watson Street are also recommended.

BREAKDOWN.—A breakdown at the City of London Electric Lighting Company's power station at Bankside caused a failure of the electricity supply lasting a quarter of an hour over a large part of the City on Monday evening.

**Longforgan (Perthshire).**—INAUGURATION OF SUPPLY.—A supply of electricity from the Grampian Scheme was inaugurated recently. Among those present were Mr. J. C. Christie, of the Central Electricity Board, Mr. W. Menzies, of Messrs. Balfour, Beatty & Co., Ltd., and Mr. D. H. Morris, the contractor for the town's lighting scheme.

**Northern Ireland.**—LURGAN (CO. ARMAGH).—The Urban District Council has received sanction from the Ministry of Commerce to a loan of £1,200 for the completion of the local electricity undertaking.

**Portland.**—ASSISTED WIRING.—The Urban District Council Electricity Committee has approved a standard wiring specification and is to obtain tenders for assisted wiring.

CANVASSING THE COUNTRY.—The Grove, Weston and Southwell districts are to be canvassed to ascertain the possible demand for electricity.

**Sadberge (Durham).**—CHARGES FOR ELECTRICITY.—The Darlington Town Council, which is to give a supply of electricity to the village, has fixed the price for street lighting at 6¼d. per kWh. The same charge will be made for domestic lighting, while heating and power charges will be ¾d. per kWh for the eight lighter months and 1¼d. for the remainder of the year.

**Severn Barrage.**—STATEMENT BY MR. PYBUS.—In the House of Commons on November 18th Mr. Louis Smith asked the Minister of Transport if he could now make any further statement as to when the report of the committee on the Severn River barrage might be expected. Mr. Pybus said he understood that the Committee of the Economic Advisory Council had encountered a large number of highly technical engineering problems in this inquiry, which was, however, being conducted as expeditiously as possible.

**South Africa.**—NEW ELECTRICITY SCHEMES.—Tenders have been invited for the installation of an electricity supply system at Maseru, Basutoland. The chief electrical engineer for the Union has been acting as consultant for the Basutoland Government for previous proposals, which have been rejected on account of cost. Vryheid Town Council has decided to spend £45,000 on mains extensions and changing over from d.c. to a.c. Negotiations between the Greytown Municipality, farmers and industrialists in the Umvoti County, and the Union Electricity Supply Commission are also expected to result in the Commission extending its supply to Greytown. Under such a scheme, the whole of the Natal midland wattle belt would be provided with electricity.

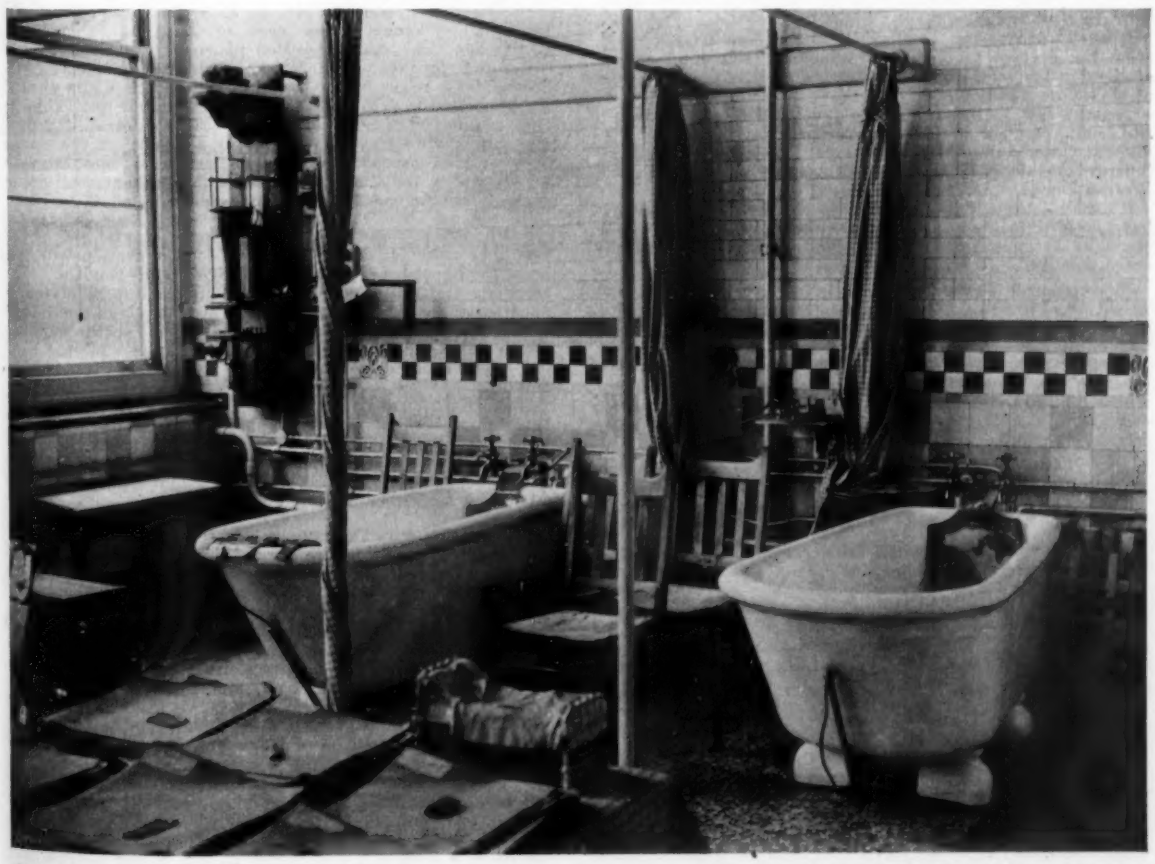
CAPE TOWN.—The City Council's estimates for 1932 provide £23,400 for street lighting.

**Stoke-on-Trent.**—EXTENSIONS.—The Electricity Committee is to provide supplies of electricity in the following districts:—Regent Road, Fenton, at a cost of £1,000; Goldenhill (£6,500); Carmountside Housing Estate (£5,600); and Greasley Road, Abbey Hulton (£300).

**United States.**—LARGE POWER DEVELOPMENTS.—A 115,000-kW turbo-generator was recently put into operation at the Waukegan generating station of the Public Service Company of Northern Illinois, bringing the total capacity of the plant to 290,000 kW. The construction at Buzzard Point, Wash., of a thermal power station having an ultimate capacity of 200,000 kW is being considered by the Potomac Electric Power Company.

**Wakefield.**—YEAR'S WORKING.—An increase from 12,025,317 to 12,746,109 kWh in the sales of electricity is recorded in the annual report of Mr. H. G. Fraser, city electrical engineer and manager, for the year ended March 31st last. The greatest advance was made in domestic electrification, shop lighting and heating, the increase in the energy sold in this section amounting to 29 per cent. The increasing popularity of the domestic rateable value tariff is shown by the fact that the sales of electricity under it rose by 57 per cent. New consumers numbered 1,268 (of whom 806 were connected under the assisted wiring scheme), making a total of 7,331. Revenue rose from £80,577 to £86,769, but the working expenditure declined from £49,763 to £48,637. The net profit was £9,013, as compared with £2,551 in 1929-30.

**Wootton Wawen (Birmingham).**—A SUPPLY IN THE NEW YEAR.—The Leicestershire and Warwickshire Electric Power Co. is to give a supply of electricity to the parish early in the new year, the question of wayleaves having been practically settled.



**Two of the electrical baths at St. Bartholomew's Hospital. They are supplied with earth-free sinusoidal current, derived from the secondary of the transformer mounted on the wall by the window. By means of the motor above the transformer, the secondary coil is made to rise and fall rhythmically over the primary coil, causing the current to surge slowly between maximum and zero.** (*See* "*Electricity in Healing*," p. 799.)

# Traction

**Carlisle.**—TRAMWAY ABANDONMENT.—The electric trams, which are to be replaced by an omnibus service run by the Ribble Company, were taken off the streets last Saturday.

**Continental.**—FRANCE.—Electrification work has begun on the 120-km. section of the Paris-Nantes line between Les Aubrais and Tours. The programme comprises three important items: a double 90,000-V transmission line from Chaingy to near Tours; 90,000-1,500-V sub-stations, and 1,500-V catenary traction lines. Five subsidiary stations are to be built, and will be fed by a 90,000-V line to be constructed between Chaingy and St. Pierre-des-Corps. The power will be taken from a large sub-station at Chaingy. The electrification of the Orleans system, which has already been carried out between Paris and Vierzon, was to have been pursued in the direction of Chateauroux, Limoges and Brive, but the company has decided that it is preferable first to equip the Orleans-Tours section, as a better utilisation of locomotives can thus be effected. Nevertheless, the electrification of the Vierzon-Limoges section will not be long delayed, and it is hoped that work will be commenced on it next year.—*Reuter's Trade Service* (Paris).

BELGIUM.—The Société Nationale des Chemins de Fer Vicinaux has just inaugurated electric services on two new lines, thus bringing the total length operated electrically to 230 km. Various other sections of these local railways, representing a further 100 km. of line, are in course of conversion.

**Croydon.**—RENEWAL OF TRACK.—The Corporation is to renew part of the tramway track at a cost of £420.

**Hull.**—PROTECTION OF MUNICIPAL TRANSPORT.—The Corporation Transport Department is negotiating with the operators of public service vehicles in the city with the intention of coming to some agreement as to the measure of prohibition or protection to be given to the Corporation tramway and 'bus services.

**L.N.E. Railway.**—RAILWAY ELECTRIFICATION.—In reply to a question in the House of Commons on November 18th as to the position with regard to the projected electric railways from Liverpool Street to Ilford and beyond, Mr. Pybus, Minister of Transport, said that his department had been informed last summer by the London and North-Eastern Railway Co. that it was actively considering the question of such developments at Liverpool Street Station, and that in the event of the London Passenger Transport Bill becoming law it was anticipated that a scheme would be ready for submission to the Standing Joint Committee of the proposed Transport Board and the amalgamated railway companies, which would be set up under the Bill to consider such proposals affecting their joint interests.

**London.**—AUTOMATIC TRAFFIC CONTROL.—The City Corporation has decided to install a system of traffic light signals at the junction of Leadenhall Street and Gracechurch Street at a cost of £487.

TROLLEY-'BUS EXTENSIONS.—The London United Tramways, Ltd., have applied to the Minister of Transport for a Provisional Order authorising the company to extend its trolley-'bus system along Ewell Road, Kingston By-pass Road, and Warren Drive.

UNDERGROUND IMPROVEMENTS.—The Underground Railways have decided to have all their coaches decorated and upholstered in the same way as those put into service experimentally early this year.

**Newcastle-upon-Tyne.**—TRAMWAY ABANDONMENT PROPOSED.—The City Council has deferred consideration of a recommendation of the Transport and Electricity Committee to substitute omnibuses for trams on the Osborne Road route.

DIESEL-ELECTRIC TRACTION.—Further trials were run last week on the Wylam Line by the new Diesel-electric rail car which has been built by Messrs. W. G. Armstrong-Whitworth and Co., Ltd. The car travels at over 60 m.p.h., and has accommodation for sixty passengers.

# Communications

**Australia.**—SHIP-SHORE TELEPHONY.—The first commercial telephone conversation between Australia and a ship in mid-Atlantic took place on November 10th. The editor of a newspaper in Sydney spoke to the commander and a passenger on the White Star liner *Olympic*, which was homeward bound from New York. The conversation, which we are informed by Standard Telephones & Cables, Ltd., was perfectly clear and intelligible, took place at 2.30 p.m. (the ship's apparent time on November 10th), while at Sydney the time was 2.30 a.m. (November 11th). The conversation lasted for five minutes, and the charge was £12 10s.

TELEPHONY.—A bulletin issued by the Postmaster-General's Department says that, although the provision of new telephone facilities has been restricted during the past few months, much has been done to give a rapid and exact service at any hour of the day or night. The average time taken to answer a local call is less than five seconds, while about 90 per cent. of calls are completed at the first attempt. The time taken to connect trunk calls averages only four minutes. There are over 6,000 exchanges in Australia, 98 per cent. being beyond the limits of the capital cities, and 3,685, or 60 per cent., have been established during the past ten years.

**Estonia.**—BROADCASTING.—In August last the number of registered radio receiving sets was 13,663, an average of 12 per 1,000 inhabitants. The licence fees are Kr. 15 (about £1) yearly per valve receiver and Kr. 9 per crystal set, payable half yearly. The transmitter at Tallinn (Reval) is of 10 kW power, and uses a wavelength of 296.1 metres. The O/ü Ringhääling (Broadcasting Co., Ltd.) holds a concession granted by the Ministry of Communications.

**Irish Free State.**—THE ATHLONE WIRELESS STATION.—A site has been definitely selected for the erection of the proposed high-power broadcasting station by the Ministry for Posts and Telegraphs, about three miles outside Athlone, County Westmeath. Work is to be started very soon by the Marconi Company, and is expected to be completed by September, 1932. It will have 80 kW power, and will be on the same lines as the British regional stations. It is to cost upwards of £70,000, and of this amount the Government has already voted £47,000.

**Latvia.**—BROADCASTING.—The number of licensed listeners in August last was 42,000, about 22 per 1,000 inhabitants. The 15-kW station at Riga uses a wavelength of 524.5 m., the service being a monopoly of the Ministry of Posts and Telegraphs. The licence fee is 21 lats (about 16s. 8d.) per annum, and is payable quarterly in advance.

**Radio Exchanges.**—TRADERS' OPPOSITION.—Local wireless retailers in various towns throughout the country are opposing the establishment of broadcast relay services. The Hertford Town Council has rejected the application of Wireless Relay Services, Ltd., as has also the Stirling T.C. The proposal of a London firm has not been sanctioned at Eastbourne, while the Abertillery U.D.C. and the Cambridge Corporation, which received offers from Messrs. King & Harper and the Cambridge Radio Relay Co., have deferred authorisation for the present.

A number of such services have been, and are to be, established however, amongst them being (according to the *Wireless and Gramophone Trader*) those of Clear-Radio, Ltd., at Rotherham; Luton Broadcast Relay Services, Ltd., at Hitchin; Rediffusion, Ltd., at Wolverhampton; By-Wire, Ltd., at Leeds, which has offered the Corporation Highways Committee 7.5 per cent. of all service rentals; and the Basingstoke Wire Broadcasting Service, Ltd., at Maidenhead, which offered a single programme for 1/6 per week, or a double programme for 2/6 per week, and to pay an initial fee of £50 to cover the Town Council's expenses in dealing with the application, an annual rental of £100, and a yearly sum based on the number of subscribers.

In Northern Ireland, Mr. J. J. Hyde has offered the Donaghadee Council 10 per cent. of the gross receipts, and Rediffusion, Ltd., has submitted plans for Bangor.

RADIO EXCHANGE.—The Works Committee of the Northfleet U.D.C. recommends granting consent to Radio Central Exchanges, Ltd., to cross streets with telephone wires to enable the company to operate a radio central exchange, the company to pay the Council 7½ per cent. of the service subscriptions received by it, and the Council (so far as it legally can or may) to agree that similar consent shall not be given to another person or company for a period of ten years.

**South Africa.**—TELEPHONY TO ENGLAND.—By the end of this year it is anticipated that telephone communication will have been established between South Africa and England. The receiving apparatus, which is to be installed at Milnerton, is expected to be ready for experimental tests about the middle of December. Improvements are being made to the land line which will connect the Cape Town exchange with the wireless station at Milnerton and the Klipheuvel transmitting station.

NEW BROADCASTING STATION.—Leading British and Continental makers of wireless apparatus have been asked to tender for the equipment of a new broadcasting station at Cape Town for the African Broadcasting Company. The station is to be of 5 to 7 kW, and tenders are due in South Africa by December 31st.

**U.S.A.**—AIRSHIP TELEPHONES.—A telephone exchange and three miles of wiring are carried by the American airship *Akron*, which has just been completed. As lightness was one of the essentials to be considered in designing the system, aluminium was used wherever possible and the whole telephone outfit, exchange and all, weighs only 250 lb. The nineteen telephones are located at strategic points. Two are provided for the observation and gun platforms on the top of the airship, two for the engine-room, and three for the gangway leading from the officers' quarters above the control room to the bow. Gangways along each side of the ship provide access to quarters, the aeroplane compartment, and engine rooms, and a number of telephones are in these gangways. The captain is able not only to talk to any single telephone, but to talk to all nineteen at once. He can also establish communication between the airship and the ground service.

TELEVISION.—The National Broadcasting Co. has erected the aerial of a television transmitter on top of the Empire State Building, 1,000 ft. above New York, says *World-Radio*. The 5-kW plant, scanning equipment, and studio are to be installed on the 86th floor of the building.

# Contract Information

*When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below*

## Contracts Open

**Aberdeen.**—November 30th. Directors of Royal Infirmary. Electric wiring installation at the medical block, New Infirmary, Forresterhill. Particulars from Mr. J. B. Nicol, architect, 367, Union Street, Aberdeen.

**Belgium.**—BRUSSELS.—December 3rd. Société Nationale des Chemins de Fer Belges (Division des Achats), 21, Rue de Louvain, Brussels. Static transformers, varying between 300 and 4,000 VA.

December 13th. Supply and laying of underground armoured h.p. cable in the Malines district.

**Cootehill (Irish Free State).**—December 7th. Urban District Council. Centrifugal pumps and electric motors. Specifications, etc. (deposit £2), from Mr. P. A. McCarthy, 26, Lower Leeson Street, Dublin.

**Czecho-Slovakia.**—PRAGUE.—November 30th. Electricity Department. Supply during 1932 of 17,000 m. of 27,000-V cable, 53,000 m. of 3,600-V cable, and 211,500 m. of 1,000-V cable.

**Denmark.**—COPENHAGEN.—December 5th. State Railways. Electrification of Copenhagen suburban lines. (A.X. 11180.)*

**Edinburgh.**—December 1st. Corporation. Fifty air brake equipments for tramcars. Specifications, &c., from the transport manager, 2, St. James' Square.

**Egypt.**—CAIRO.—December 8th. Department of Public Health. Automatic electric refrigerators. (G.X. 10889.)*

**Farnworth.**—December 5th. Urban District Council. L.p. pillar, disconnecting boxes, frames and covers. (See this issue.)

**Gravesend.**—December 2nd. Town Council. Wiring for additional lighting at Whitehill Lane Isolation Hospital. Particulars from the engineer, Electricity Department, 17, Harmer Street.

**Greece.**—ATHENS.—Fire Brigade Service. Telephones. (A.X. 11192.)*

**Harrogate.**—December 15th. Corporation. Overhead lines. (See this issue.)

**Iraq.**—MOSUL.—December 30th (time extended). City Council. Complete town lighting plant. (November 6th.)

**London.**—BETHNAL GREEN.—November 30th. Borough Council. Electric lighting installation work at tenements. (November 20th.)

CENTRAL ELECTRICITY BOARD.—December 18th. Construction of site works, foundation works, etc., at Cardiff and Newton Abbot. (November 20th.)

HAMMERSMITH.—December 4th. Electricity Department. Wiring work. (See this issue.)

OFFICE OF WORKS.—December 7th. Steel conduit tubes, switch- and plug-boxes. (See this issue.)

**Manchester.**—December 5th. Electricity Committee. Lamp shades. (See this issue.)

**New Zealand.**—WELLINGTON.—February 2nd. Public Works Department. Additional 11,000-V switchgear (A.X. 11163)*, and reactors (A.X. 11161)* for Lake Coleridge power scheme.

April 5th. Distribution switchboards and alarm panels for the Waitaki power scheme. (A.X. 11191.)*

Trade Commissioner. Mechanical stokers. (G.X. 10928.)*

**Plymouth.**—December 15th. Electricity Department. Steam boilers. (See this issue.)

**Portsmouth.**—December 9th. Electricity Department. Cables. (See this issue.)

**Rochdale.**—December 1st. Electricity Department. Meters. (November 20th.)

**Runcorn.**—November 30th. Rural District Council. Electrically operated pumping machinery, etc. Specifications, etc. (deposit £3 3s.), from Mr. J. O. Hunter, 69, High Street.

**Sandown (I.O.W.).**—December 1st. Urban District Council. Electrical plant for waterworks pumping station, with wiring work. Particulars from the engineer, Town Hall.

**South Africa.**—JOHANNESBURG.—December 14th. Railways and Harbours. Motor-driven vertical face grinding machine. (A.X. 11168.)*

January 4th. South African Railways and Harbours. Electric railway signalling apparatus for Salt River. (A.X. 11186.)*

RAND WATER BOARD.—December 30th. Turbo-driven centrifugal pump. (G.X. 10908.)*

January 5th. Water tube boiler, superheater, mechanical stoker, etc. (G.X. 10909.)*

January 8th. Horizontal centrifugal pump, electric motor and other electrical gear. (G.X. 10941.)* Vertical spindle centrifugal pump and electric motor. (G.X. 10942.)*

CAPE TOWN.—January 6th. Electricity Department. Capacitor equipment. (A.X. 11197.)*

DURBAN.—December 11th. Corporation. H.p. metalclad switchgear for Hewitt Road sub-station. (A.X. 11177.)*

**Tadcaster (West Riding).**—November 28th. County Council Public Assistance Committee. Installation of inter-communication telephone equipment at County Poor Law Institution. Specifications, etc., from the county architect, County Hall, Wakefield.

**Tutbury (Staffs).**—December 2nd. Rural District Council. Electrically driven pumping unit for Barton-under-Needwood sewerage extension. Particulars from Willcox & Raikes, 33, Great Charles Street, Birmingham.

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed

**Croydon.**—Electricity Committee. Recommended. Rectifier plant for charging electric vehicles at new central garage (£145). Hewittic Electric Co.

**Dorset.**—Public Assistance Committee. Accepted. Installation of electric lighting at Poole Institution (£396).—A. R. Wilson.

**Glasgow.**—We are informed that the contract for two electric lifts for St. Andrew's Halls, mentioned in this column in our issue of September 11th, was placed with Messrs. A. & P. Steven, Ltd., and not as stated by us.

**Government Contracts.**—The following contracts were placed by the various Government Departments during October :—

ADMIRALTY (CONTRACTS AND PURCHASE DEPARTMENT).

Electric cable.—Anchor Cable Co.; B.I. Cables; Derby Cables; Edison Swan Cables; Enfield Cable Works; G.E.C.; Glover & Co.; Hackbridge Cable Co.; Hooper's Telegraph & I.R. Works; Johnson & Phillips; St. Helens Cable & Rubber Co.; Siemens Bros. & Co.

Inductance coils.—Marconi's; H. W. Sullivan.

Gearing and electrical equipment for drainage pump.—W. H. Allen, Sons & Co.

Portable searchlight generating set.—The liquidators of Arrol, Johnston & Aster Engineering Co.

Self-contained electric lamps.—Engineering & Lighting Equipment Co.

Automatic starters and resistances.—Watford Electric & Mfg. Co.

Protective apparatus for e.h.p. switchgear.—G.E.C.; Metropolitan-Vickers; George Ellison.

Fuse release switches.—Bertram Thomas; Whipp & Bourne.

Change-over service switches.—Whipp & Bourne; Bertram Thomas; G.E.C.

Wireless transmitters.—Gambrell Bros.; Marconi's.

5-ton electric traveller.—J. Adamson & Co.

Wireless valves.—G.E.C.

WAR OFFICE.

Wireless telegraph sets and parts.—I.R.G.P. & Telegraph Wks. Co.

AIR MINISTRY.

Accumulators.—C.A.V.; Bosch.

Condensers.—Muirhead & Co.

Wavemeters.—Marconi's.

CROWN AGENTS FOR THE COLONIES.

Wire.—B.I. Cables; Henley's.

X-ray apparatus.—Schall & Son.

POST OFFICE.

Telephonic apparatus.—Ericsson Telephones; Phœnix Telephone & Electric Wks.; Siemens Bros.; Standard Telephones & Cables; Telephone Mfg. Co.

Battery boxes.—Ericsson Telephones; Siemens Bros.

Cable.—B.I. Cables; Siemens Bros.; Standard Telephones & Cables.

Vacuum cleaners.—British Vacuum Cleaner & Engineering Co.

Loading coils.—Siemens Bros.

Telephone cords.—Phœnix Telephone & Electric Wks.

Meters.—Chamberlain & Hookham.

Rectifiers.—Edison Swan Electric Co.

V.i.r. wire.—Enfield Cable Works.

Additional loading—London-Birmingham-Liverpool cable.—Standard Telephones & Cables.

Fire alarm system—Willesden District Council.—Automatic Telephone Mfg. Co.

Power plant, Nottingham telephonic repeater station.—Haslam & Newton.

Telephone exchange equipment.—Urmston (Manchester).—G.E.C. Sub-contractors: D.P. Battery Co. for batteries. Leeds.—A.T.M. Co. Southampton, Aston Cross (Birmingham), and Uxbridge.—Siemens Bros. Sub-contractors for Uxbridge: Hart Accumulator Co. for batteries; Crompton Parkinson for charging and ringing machines. Terminus (London).—Standard Telephones & Cables.

Telephonic repeater equipment (Glasgow).—Standard Telephones & Cables.

H.M. OFFICE OF WORKS.

Converter plant, etc., N. P. L., Teddington.—G.E.C.

Switchgear, Geological Museum, S.W.—Malcolm & Allan.

**Leeds.** — Electricity Committee. Accepted. Cables.—Henley's (£346); Enfield Cable Works (£625); Macintosh Cable Co. (£626); Edison Swan Cables (£1,030).

**Liverpool.**—The Falcon Electrical Co. has secured the contract for the electric lighting and power installation in bungalows at Fairy Cottage Station, near Laxey, and also in the old schools at Laxey.

**London.**—L.C.C.—Main Drainage Committee. Wiring and fittings for electric lighting and heating, wiring for electric motors and provision of telephones at the Northern outfall works :—

| | £ | | £ |
|---|---|---|---|
| HARLAND & WOLFF, LTD. (Accepted) ... ... | 4,739 | Hall & Stinson, Ltd. ... | 6,319 |
| Barlow Bros. ... ... | 5,493 | T. Clarke & Co., Ltd. ... | 6,696 |
| Electrical Installations, Ltd. ... ... ... | 5,882 | Buchanan & Curwen ... | 6,999 |
| Pinching & Walton ... | 6,160 | H. J. Cash & Co., Ltd. ... | 7,369 |
| | | Berkeley Electrical Engineering Co., Ltd. ... | 8,383 |

STOKE NEWINGTON.—Electricity Committee. Recommended. Supply of electric cookers and kettles for the period ending March 31st, 1932. Cookers.—Belling & Co.; G.E.C. Kettles.—Bulpitt & Co., Ltd.

**Southend-on-Sea.**—Town Council. Accepted. One year's supply of 3,000-V and 11,000-V transformers, switchgear, etc., required in connection with the change-over.—Crompton Parkinson; G.E.C.

The Town Council has appointed the following electrical contractors to execute works of assisted wiring on terms contained in a schedule:—H. A. Lee, Ltd.; W. H. Squire; W. Jay; R. B. Emerson; G. A. Weston; Long & Carter, Ltd.; F. P. Richard & Co.; and Bell & Edmonds.

# Forthcoming Events

**Electrical Trades' Commercial Travellers' Association.**—Friday, November 27th. Criterion Restaurant, W. 7 for 7.30 p.m. Dinner-dance.

**Royal Institution.**—Friday, November 27th. Institution, London. 9 p.m. "The Work of Sir Charles Parsons." Sir Alfred Ewing. Friday, December 4th. 9 p.m. "Optics of Electrons." Mr. G. P. Thomson.

**Royal Society of Arts.**—Monday, November 30th. Adelphi, W.C. 8 p.m. "Diesel Engines." Mr. H. R. Ricardo.

**Electrical Association for Women.**—Monday, November 30th. Institution of Electrical Engineers, London, 6.15 p.m. "The Effect of Electric Treatment on the Skin." Dr. Elizabeth Sloan Chesser.

**Institution of Heating and Ventilating Engineers.**—Wednesday, December 2nd. Swedenborg Hall, W.C. 7 p.m. "The Principles of Calculation of Low Temperature Radiant Heating." Mr. A. H. Barker.

**Association of Supervising Electrical Engineers.**—Thursday, December 3rd. Magnet House, Kingsway, W.C. "Problems connected with the Change-over of Power Plant to A.C." Mr. H. Nielson.

**Institution of Electrical Engineers.**—Thursday, December 3rd. Institution, London. 6 p.m. "Bushing Insulators for Outdoor Type Transformers." Mr. W. J. John. (*Scottish Students' Section.*)—Tuesday, December 1st. Heriot-Watt College, Edinburgh. 7.15 p.m. "Application of Electricity to Railway Signalling." Mr. D. Old. (*North-Western Students' Section.*)—Tuesday, December 1st. Engineers' Club, Manchester. 7.15 p.m. "Oil-Filled Cables." Mr. R. E. G. Horley. (*Wireless Section.*)—Wednesday, December 2nd. Institution, London. 6 p.m. "Reflection Methods of Measuring the Depth of the Sea." Com. J. A. Slee. (*London Students' Section.*)—Wednesday, December 2nd. 2.30 p.m. Visit to the L.G.O.C. overhaul and repair works, Chiswick. (*Meter and Instrument Section.*)—Friday, December 4th. Institution, London. 7 p.m. "An Investigation of the Problems relating to the Use of Pivots and Jewels in Instruments and Meters." Mr. V. Stott. (*North-Eastern Students' Section.*)—Friday, December 4th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "Some Features and Considerations in the Layout of Power Station Electrical Equipment." Mr. T. H. Carr.

**British Institute of Radiology (Röntgen Society).**—December 2nd, 3rd and 4th. Central Hall, Westminster, S.W. Congress of Radiology and Radiological Exhibition. December 4th. Trocadero Restaurant, W.C. 7.30 p.m. Annual dinner.

**Junior Institution of Engineers.**—Friday, December 4th. Royal Society of Arts, W.C. 7.30 p.m. Inaugural meeting. Presidential address. "Some Aspects of Development in the Generation and Transmission of Electricity: Its Influence on the Design of Plants and the Growth in the Utilisation of Electrical Power." Dr. S. L. Pearce.

# Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

ATLAS electric iron.
QUICK SERVICE fusewire holder with two bobbins, one for 5 amp. and the other for 10 amp. wire.
DUGDALE electric boiler.
ALPHA or ALFA insulating paper.
VINYLITE artificial resin.
TREDELECT cut-outs.

# Notes

## The Electricity Commissioners' Report

By a commendable speeding-up, the eleventh Annual Report of the Electricity Commissioners, covering the year ended March 31st, 1931, was issued this week as we went to press. The last report was dealt with in our issue of March 6th of this year, so that more than three months have been saved. In spite of the adverse trade conditions, particularly in their effect on a decline of output of electricity in the North-East England and Central Scotland areas, the total kWh generated has increased by 545 million, an advance of over 5 per cent. This achievement is largely due to the growth in the domestic load. Some 10,917 million kWh was generated by authorised undertakings, the total including railways, tramways, and certain non-statutory undertakings amounting to 12,333 million kWh. The large output was accompanied by a decrease of 1.4 per cent. in the amount of coal burned.

## Cardiff Engineering Exhibition

The tenth Engineering Exhibition, which opened at Cardiff on November 18th for ten days, is the largest yet held. Upwards of seventy firms are exhibiting, about 50 per cent. more than last year. The electrical exhibits include mining-type switchgear, transformers, and motors displayed by leading manufacturers, and a demonstration of lighting effects.

## E.C.A. Awards to Apprentices

In connection with the results of the 1931 Course "B" City and Guilds' Examination in electrical engineering work, the Electrical Contractors' Association has made the following awards to apprentices:—F. C. Cant (Marryat & Place, London), gold medal and £20; M. R. Taylor (W. J. Furse and Co., Ltd., Nottingham), silver medal and £20; J. E. de Vall (Marryat & Place), bronze medal and £10; L. J. Martin (S. T. Meggitt, Bournemouth) and F. Magetti (Marryat & Place) southern section award (£5 divided); E. F. Wilding (R. A. Parsons, Gloucester), western section award (£5); A. N. Rayner (A. K. Jackson, Dublin), Irish section award (£5); and F. Kenyon (C. E. Price, Liverpool), northern section award (£5). There was no apprentice eligible for the Midland section award as it was found that the only candidate (except the silver medallist) in the employ of an E.C.A. member in that section who passed the examination was not indentured.

## B.E.S.A. Change of Name

During recent years the British Engineering Standards Association has prepared specifications and established standards for the building, chemical, and textile industries as well as for engineering. There are now 600 committees and over 400 published specifications. In order to regularise the position, the Association has been divided into four main divisions of equal standing each under its own council, the change being authorised by a Supplemental Royal Charter. In future the name of the Association will be the "BRITISH STANDARDS INSTITUTION."

## Appointments Vacant

Switchboard attendant for the Bermondsey Electricity Department.

Assistant engineer for Georgetown (British Guiana) Sewerage and Water Commissioners.

(See our advertisement pages to-day.)

## Lighting the Mansion House

On page 807 we reproduce a number of illustrations of the new lighting installation which has recently been carried out in connection with the restoration of the Mansion House, London. The installation presented a number of unusual problems and Messrs. Burstall & Monkhouse, the consulting engineers, are to be congratulated on the way in which they have been surmounted. The whole of the supply system both for lighting and power has been renewed, extended and brought up to date. The wiring is run in screwed conduit and all distribution boards and switches are ironclad. A complete system of power plugs for vacuum cleaning purposes has been installed and the circuits are of sufficient capacity to permit the use of electric radiators of moderate size. Electricity for the main lighting system and for the power plugs is being taken from the City of London Electric Lighting Co., Ltd., but in case of a failure of this supply a part of the lighting circuit is connected to the mains of the Charing Cross Company. In the Egyptian Hall and the Ball Room the new system of lighting is entirely indirect and is provided by "Osram" lamps placed above the cornices. The way in which this type of lighting brings out the beauty of the ceiling can be realised from one of our illustrations which was taken solely by means of this illumination. In the Egyptian Hall, in addition to the cornice lighting, strip lighting by means of "Osram Striplite" lamps has been provided under the galleries, partly for the purpose of lighting the floor space under these and partly for decorative effect. Round the cornice in the Saloon are 123 30-W "Osram" tube lamps in "Huntalite" reflectors, while there are similar installations in the Drawing Rooms. An entirely new "Marconiphone" loud-speaker installation has been carried out in the Egyptian Hall, the instruments being suspended from the columns by ornamental iron work, arched supports and brackets specially designed to match the surroundings. Ten microphone plugs for after-dinner speeches have been placed in traps in the floor. A new automatic telephone system has also been installed.

## The Railway Companies and Electrification

Mr. Pybus, Minister of Transport, stated in the House of Commons on November 18th that he was circulating a copy of the observations made by the railway companies upon the recommendation by the Royal Commission on Transport that all suburban services should be electrified. In this the companies state that they have made and are making considerable progress in the matter of suburban electrification. They think it important, however, to proceed on the basis of individual examination of particular problems rather than on the basis of a sweeping assertion such as that put forward by the Royal Commission. Suburban electrification must turn upon the question of remuneration, which, in turn, depends upon an intensification of the service, and a consequent increase in passengers and revenue. The railway companies have to bear in mind the activities of road competitors and their experience that traffic developed by heavy capital outlay on electrification schemes has been, in some instances, so affected by such competition as to deprive the railway companies of reasonable remuneration for their expenditure. Fears of this character will be largely removed, in the case of London suburban traffic, as regards further losses of traffic if the London Transport Bill should receive the Royal Assent. In other suburban areas, however, the fact of road competition must continue to discourage the expenditure of capital upon electrification. The railway companies will continue to examine the question of suburban electrification with the greatest care, but they must continue to do so on the basis of individual proposals.

### Transformer Inter-turn Insulation

The British Enginering Standards Association has issued a Specification (No. 422-1931) for the proportioning and testing of transformer inter-turn insulation. The proportioning is based upon specified minimum test voltages, and it is provided that, when required, insulation tests shall be made upon sample coils insulated in the same way as the windings under consideration and immersed in oil, each coil having its conductors severed at one point so that the appropriate high-voltage test may be applied between adjacent conductors. Factors are given by which the scheduled test-voltages are increased with an increase in transformer rated output, and by which the test-voltages are reduced for transformers below certain rated outputs, depending upon the line voltage and the connections employed. The specification applies to all single-phase and polyphase transformers with windings designed for terminal voltages of 1,000 V and above, and connected in any star or delta formation on three-phase systems whose neutral point is normally at earth potential, whether insulated or earthed. Copies of the Specification may be obtained from the Publications Department of the Association at 28, Victoria Street, S.W.1, price 2s. 2d. post free.

### Rural Electrification in New England

Statistics compiled by the United States Bureau of the Census and summarised by the National Electric Light Association show the extent of farm electrification in the six New England States as at April 1st, 1930. The total number of farms using utility power was 45,522, or 36.4 per cent. of the total of 124,925. Individual sets were being used on 5,917 New England farms, 3.8 per cent. of the total, and the total number of farm homes lighted by electricity was 51,439, or 40.2 per cent. of the total. Telephones were installed in 77,094, or 61.7 per cent., of the farms in New England, and 32,684, or 26.2 per cent., had running water in bathrooms. Some 32 per cent., or 14,792 of the farms employing utility power, had 23,746 electric motors, and 34,481 stationary gas engines were installed in 27,828 farm properties.

### New Plant at Torquay

The part which is likely to be played by electricity in the anticipated agricultural revival was dealt with by Sir John Brooke, C.B., vice-chairman of the Electricity Commissioners, in a speech at the inauguration on November 19th of a new 7,500-kW turbo-alternator at the Newton Abbot power station of Torquay Corporation.

Sir John said that evidence from other countries was that agricultural development in general, and dairying in particular, was more and more dependent upon electrical power. The high-voltage transmission lines of the British Grid would serve the important task of interconnecting stations, but it was left to the enterprise of the local undertaking to deliver electricity to the public, and the undertakings, in their turn, were very largely dependent on the enterprise of individual consumers. There was a very big relation between the amount of output and the cost of electricity. To expand a business generally meant in one way or another a cheapening over the whole area, and selling electricity was just like selling anything else. When they took power from the Central Electricity Board their savings would begin to be really large.

The event was made the occasion of a civic visit to the power station by representatives of the Councils in the Torquay Corporation's area of supply, which it was announced during the proceedings had now been extended, by the grant of an order for the South Hams district, from two hundred and forty-seven to four hundred and thirty-five square miles. The Mayor of Torquay said that in 1922 the Corporation sold two million kWh and last year over twenty and a half millions.

# Floodlighting Development

By H. E. HUTTER

**Expression can be increased by the correct use of colours**

THE progress of the art of floodlighting brings in due course new variations tending to raise the art to a higher level of perfection. The most obvious variations in floodlighting effects are obtained by changing colour, and now to the clear light of the early installations the complete range of red, orange, purple, amber and green is available. The development of colour floodlighting in America is aided by the development of the modern American set-back type of building. The successive terraces of the structure invite the use of successive shades and tones of light, gradually increasing in density towards the top. It has been found desirable in planning a coloured-lighting installation to make the brighter colours dominate, as these colours are more easily seen and hence give the floodlighted building a wider range of effectiveness.

The beams of light may be made to move, changing the shape and the direction of the shadows, or for the weaving of patterns colours may be changed or blended from one hue to another by means of dimmers, the changing tints and tones being produced by the varying of the intensity of the clear light superimposed on the other colours.

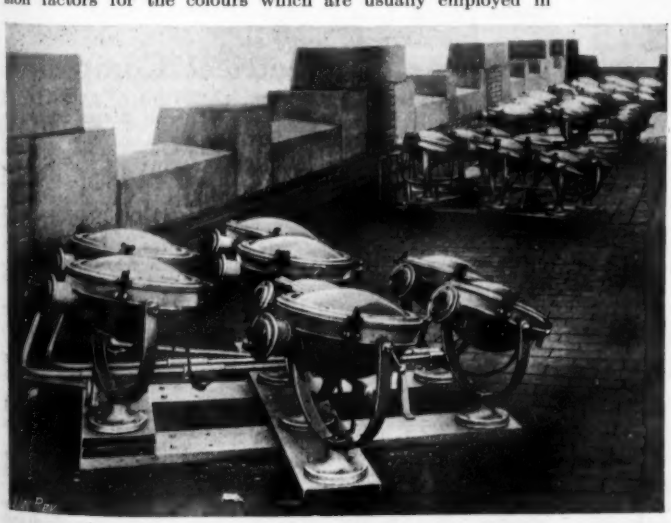
The utilisation of coloured lenses demands an increased wattage to allow for light absorption, and the light transmission factors for the colours which are usually employed in floodlighting schemes are set out in percentage form below :—

| Colour ... ... | Red | Green | Blue | Amber |
|---|---|---|---|---|
| Factor per cent. ... | 10/20 | 10/16 | 3/5 | 50/60 |

The Rand Building Floodlighted

As an example of this type of illumination, the Rand building at Buffalo may be quoted. This is a building of 28 storeys which after dark exhibits a moving panorama of light from the 18th floor to the top, in blending colours of red and blue fading out into clear white. The scheme on the lower deck is a change from very dark blue through all the lighter shades to white and back again to pure blue. From the second deck red and white is used changing from dark red to pink and finally to white and back again repeatedly through the same colour cycle.

The lighting equipment consists of sixty-two projectors with a total loading of 50 kW, using inner blue lenses and diffusing outer glasses, combined with twenty-two 500-watt projectors with diffusing lenses only, mounted on the first deck. At the twenty-first floor there are fifty-one 1,000-watt projectors with diffusing lenses and red inner glasses, together with fifty-four 1,000-W projectors with rectilinear lenses. The two schemes are actuated by motor-driven dimmers, the first cycle taking 4 min. and the second cycle 2 min. to complete.



Floodlight batteries

# Our Personal Column

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements**

**Sir G. M. Allard**, chairman of Amalgamated Wireless (Australasia), Ltd., and **Sir William Vicars**, a director, have resigned. **Mr. Coates**, of Sydney, a member of the federal executive of the Labour Party, and **Mr. Frank Strahan**, assistant secretary to the Prime Minister's department, have been appointed to fill the vacancies.

**Mr. L. E. Wilson, elected to the Manchester City Council**

**Mr. L. E. Wilson**, of Messrs. L. E. Wilson and Co., Ltd., electrical contractors, was recently returned to the Manchester City Council as a representative of the Collyhurst Ward. He is an associate member of the Institution of Electrical Engineers, and a member of the Electrical Contractors' Association. He was a member of the technical staff of the late National Telephone Co. in London, Manchester, and elsewhere. Several arrangements connected with "Electrophone" reception apparatus and distribution equipment were associated with his name. Prior to transfer to Manchester he was metropolitan workshop superintendent at Telephone House, London. In 1905 he established his present company, and has taken a part in the electrification of cotton mills. Other important contracts carried out by the company include the installation of telephones in the oilfields and refineries belonging to the Anglo-Persian Oil Co., Ltd., in Persia.

**Mr. Wm. C. Macfarlane** has joined the technical and designs staff of the Midland Electric Manufacturing Co., Ltd., Birmingham.

**Mr. A. S. Herbert**, chief representative in Australia of the English Electric Co., Ltd., is visiting Great Britain on business.

**Mr. R. S. Spencer**, shift engineer at the Dover electricity works, has secured a position at the Beckenham Urban Council's electricity works.

**Mr. P. R. Coursey**, B.Sc., formerly chief engineer of the Dubilier Condenser Co. (1925), Ltd., has been appointed technical director of the company. **Mr. F. H. McCrea**, sales manager, has been appointed sales director.

**Miss Rachel Thorp**, of the British Electric Transformer Co., Ltd., has been appointed cookery demonstrator to the Exe Valley Electricity Co., Ltd.

**Mr. J. Hastings**, son of Mr. A. J. Hastings, mains superintendent at the Great Yarmouth municipal electricity works, who has for the past two years been an assistant at Electric House, has secured an appointment at the Norwich electricity works, and has been presented by his colleagues with a box of drawing instruments.

**Mr. A. J. Grover**, who since 1925 has been junior mains assistant in the West Ham electricity department, has been appointed by Spalding Urban District Council as technical assistant electrical engineer.

The friends of **Col. R. E. Crompton** will hear with regret that he is ill, and will join with us in hoping for his early restoration to his usual good health.

**Mr. W. E. Warrilow**, who recently left New Distributors of Edison Storage Batteries, Ltd., has returned to the advertisement staff of Odhams Press, Ltd.

**Mr. H. W. Flashman**, managing director of the Australian Westinghouse Electric Co., Ltd., Sydney, is going to New York, and is visiting England *en route*.

**Mr. F. Risch** has ceased to occupy the position of London representative of the Yorkshire Electric Transformer Co., Ltd. His private address is 19, Denman Street, W.1.

## Obituary

**Mr. A. H. Darker.**—We regret to record the death, which occurred at Southport, Queensland, on November 15th, of Mr. Alfred Henry Darker, formerly chief electrical engineer of Messrs. J. Stone & Co., Ltd., of Deptford. Mr. Darker made periodical tours of the world in the interests of his company, and it was his practice to keep his friends informed regarding his movements, his arrival at important places, and so on, through the Personal Column of the ELECTRICAL REVIEW.

**Wills.**—The late **Professor Archibald Barr**, F.R.S., chairman of Barr & Stroud, Ltd., left personal estate of £157,131, plus the value of his real estate.

**Mr. J. H. Slee**, formerly with the British Thomson-Houston Co., Ltd., left £1,267 (net personalty £1,170).

# Financial Section

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares**

## New Companies Registered

**Hedingham Radio, Ltd.**—Private company. Registered November 20th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio equipment, gramophones, etc. The permanent directors are: H. G. S. Gibson, "Eriskay," Sible Hedingham, Essex, and A. E. Branch, 37, Church Street, Sudbury, Suffolk. Registered office: Gibson's Garage, Swan Street, Sible Hedingham, Essex.

**John T. Cartwright & Sons, Ltd.**—Private company. Registered in Edinburgh on November 14th. Capital, £10,000 in £1 shares. Objects: To carry on the business of wholesale electrical factors, manufacturers, manufacturers' agents and general merchants, etc. The directors are: T. D. Cartwright, 135, Fotheringay Road, Glasgow; G. W. Cartwright, 53, Ancaster Drive, Jordanhill, Glasgow; and J. T. Cartwright, 97, St. Andrews Drive, Pollokshields, Glasgow. Registered office: 3, Cadogan Street, Glasgow, C.2.

**Electric Sales, Ltd.**—Private company. Registered November 21st. Capital £500 in £1 shares. Objects: To carry on the business of manufacturers of, agents for, and dealers in electrical and wireless apparatus, etc. The first directors are: E. A. J. Brown, 16, Marchwood Crescent, Ealing, W.5, and R. L. Rait, 46, Crescent Road, Kingston Hill, both directors of Auto Service, Ltd. Registered office: 26, Station Parade, Ealing Common, W.5.

**Electric Totalisators.**—Private company. Registered November 23rd, with a nominal capital of £50,000 in £1 shares. Objects: To acquire and apply for patents for inventions and rights to inventions relating to the manufacture of electrical, automatic, or other totalisators and recording devices; manufacturers of and dealers in electrical appliances, etc. The first directors are: Lord Lovat, Beaufort Castle, Beauly, Inverness-shire, chairman; Sir Harold A. Wernher, Someries House, Regent's Park, N.W. (chairman of Electrolux, Ltd.); T. Kirkman, Croslands, Parkside Road, Northwood, Middlesex (managing director, Ericsson Telephones, Ltd.); J. W. Gibson, Stanwell Lodge, Stanwell, Middlesex; and B. E. Foster, 117, Babington Road, Streatham, S.W. (managing director, British Automatic Totalisator, Ltd.). The registered office is at 56, Kingsway, W.C.2.

**Hellesens, Ltd.**—Private company. Registered November 21st, with a nominal capital of £80,000 in £1 shares (56,000 "A" and 24,000 "B"). Objects: To carry on the business of manufacturers, exporters, and importers of and dealers in electric batteries, dynamos, motors, switchboards, insulating materials, wireless sets and apparatus, gramophones, etc. The first directors are: H. V. Ludvigsen, Vestagervij 26, Copenhagen; W. Jacobsen, Vesterbragade 152, Copenhagen; A. H. Hunt, Selsdon Court, Sanderstead; and C. H. Hunt, 12, Normanton Road, South Croydon. Registered office: H.A.H. Works, Tunstall Road, Croydon.

## Returns of Electrical Companies

**Eckington Electric Supply Co., Ltd.**—Capital, £5,000 in £1 shares. Return dated August 12th, 1931. All shares taken up. £5,000 paid. Mortgages and charges, nil.

**West Cornwall Electricity Supply Co., Ltd.**—Capital, £100,000 in £1 shares. Return dated April 9th, 1931. All shares taken up. £12,506 2s. 6d. paid (being £1 per share on seven and 2s. 6d. per share on 99,993 shares). Mortgages and charges, nil.

**Exe Valley Electricity Co., Ltd.**—Capital, £100,000 in £1 shares. Return dated September 14th, 1931. 90,000 shares taken up. £84,700 paid. £5,300 considered as paid. Mortgages and charges, nil. A return of allotments made up to October 12th, 1931, shows a further 10,000 shares allotted, payable in cash and fully called up.

**Finnell System, Ltd.**—Capital, £3,000 in £1 shares. Return dated November 3rd, 1931. All shares taken up. £3,000 paid. Mortgages and charges, nil.

**Boynton & Co., Ltd.**—Capital, £300 in £1 shares. Return dated June 17th, 1931. All shares taken up. £300 paid. Mortgages and charges, nil.

**Continental Hydro-Electric Co., Ltd.**—Capital, £20,000 in £1 shares. Return dated October 14th, 1931. 5,000 shares taken up. £5,000 paid. Mortgages and charges, nil.

**Lewis Thomas & Sons, Ltd.**—Satisfaction in full on October 20th, 1931, of mortgage or charge dated April 1st, 1926, and registered April 20th, 1926, securing £1,500.

**Piccadilly Signs, Ltd.**—J. H. Macaulay, of 82, Cranley Gardens, Muswell Hill, N.10, ceased to act as receiver and manager on November 10th, 1931.

**Frinton-on-Sea & District Electric Light & Power Co., Ltd.**—Capital £50,000 in 7,300 preference and 42,700 ordinary shares of £1 each. Return dated July 15th, 1931. All shares taken up. £50,000 paid. Mortgages and charges, nil.

**British Arc Welding Co., Ltd.**—Capital £50,000 in £10 shares. Return dated August 10th, 1931. 1,474 shares taken up. £12,740 paid. £2,000 considered as paid. Mortgages and charges, nil.

**Scattergood & Johnson, Ltd.**—Capital £10,000 in 2,000 preference and 8,000 ordinary shares of £1. Return dated August 13th, 1931. 7,928 shares taken up.—£1,252 paid. £6,676 considered as paid. Mortgages and charges, nil.

**Curtis Manufacturing Co., Ltd.**—Capital £6,000 in £1 shares. Return dated November 2nd, 1931. All shares taken up. £1,000 paid. £5,000 considered as paid. Mortgages and charges, nil.

**Ricardo & Co., Engineers (1927), Ltd.**—Capital £21,000 in 20,000 preference shares of £1 and 20,000 ordinary shares of 1s. each. Return dated November 9th, 1931. All shares taken up. £2 paid. £20,998 considered as paid. Mortgages and charges, £6,000.

**A. Berkeley, Ltd.**—Capital £10,000 in £1 shares. Return dated August 3rd, 1931. 7,800 shares taken up. £7,800 paid. Mortgages and charges, nil.

**General Cable Manufacturing Co., Ltd.**—Particulars filed of £38,150 debentures authorised November 2nd, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued. Satisfaction to the extent of the balance on November 2nd of debenture dated June 30th, 1928, and registered July 5th, 1928, securing £35,000.

**Reliability Stores, Ltd.**—J. P. Gilbert, of Kingston Lane, Southwick, Brighton, was appointed receiver and manager on November 14th, under powers contained in debenture dated October 15th, 1931.

**Lincolnshire Electrical Co., Ltd.** (formerly Wm. Pool, Ltd.).—W. W. Shores, of 1a, Town Hall Street, Grimsby, was appointed receiver and manager on November 13th, under powers contained in debentures dated August 6th, 1927, and September 5th, 1927.

**Courtin & Walsh, Ltd.**—R. F. Woodburn, of 92, Inverness Terrace, W.2, was appointed receiver on November 14th, under powers contained in debenture dated October 8th, 1928, and transfer dated January 26th, 1931.

# City Notes

**The Perak River Hydro-Electric Power Co., Ltd.,** held its annual meeting on November 18th, Mr. G. Balfour (chairman) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, November 20th, p. 793), the chairman said they had refrained from issuing any part of the prior lien debenture stock, except as collateral for a loan, in the hope that they might be able to formulate a scheme of capital reorganisation which would enable them to cancel the prior lien, but it was useless to contemplate this until they saw signs of stability and improved trade conditions. The steam station had not been in commercial operation since the hydro-electric plant was put into commission, except for short intervals for emergency purposes. During the year under review the company had sold 58,540,000 kWh, the demand at the end of the year being 11,000 kW. The bulk of their demands came from the tin mines. In March last the tin restriction scheme came into force in Malaya. Under the scheme the Malayan output had been restricted to 3,780 tons per month, and the reduced output of 2,000 tons per month represented over 38 per cent. of the total world restriction. In order to make this contribution, the assessments of potential production of the individual mines in Malaya, based on the 1929 figures, had, since August last, each been reduced by 60 per cent. The operation of the scheme, therefore, had caused a considerable loss to the company. Any improvement in the world demand for tin with a continuation in the improvement in price would soon be reflected in increased revenue for the company. Following upon the reorganisation of the board, a rapid investigation of the position in Malaya and London was undertaken, with the result that during the current year expenditure would show a reduction of approximately £25,000. These reductions should enable the company to maintain last year's earnings even with reduced receipts. A special tariff had been introduced to help the tin producers. They had provided funds to the Kinta Electrical Distribution Co., Ltd., for a small plant at Kuala Kangsar, and they were now not only in control by virtue of the articles of association, but also as majority shareholders. Regarding future prospects, they believed they had seen the worst, and they might even see some improvement this year. If the world demand for tin was restored, thus enabling Malaya to work her tin properties up to something like their capacity, a price of £150 per ton or over would enable them to add considerably and rapidly to their demand. The report and accounts were adopted.

**Tube Investments, Ltd.,** report a profit for the year ended October 31st of £239,422, as compared with £245,998 for 1929-30. The preference dividend absorbs £41,763 and £16,009 has been applied to writing down Government securities to market value. It is proposed to pay a dividend of 8 per cent. (against 10 per cent.), on the ordinary shares, with a relative rate on the liaison ordinary shares, and to transfer £33,587 to reserve, leaving £74,997 to be carried forward, against £76,943. The directors state that the experience of twelve months' working of the arrangements with Stewart & Lloyds has confirmed them in their opinion that the agreement would bring sensible and lasting benefits to both companies. Meeting: December 2nd.

**Callender's Share & Investment Trust, Ltd.,** reports a net profit for the year ended August 31st of £36,414, as compared with £33,178 in the previous year. Reserve receives £500, and a dividend of 20 per cent. (same) is paid, leaving a balance of £10,897, which, with £43,404 brought in, is carried forward.

**The Galloway Water Power Co.** was to make an issue yesterday (Thursday) of £1,400,000 5 per cent. redeemable debenture stock 1947-1991, at 93. According to the *Financial News* the company, which is not yet operating, is to develop the water power of the Galloway area on the River Dee, and its output will be sold direct to the Central Electricity Board. A first interest payment of £1 13s. 4d. on the new stock will be made on June 1st next. Interest and sinking fund payments will be covered from a date not later than August 1st, 1936, by payments which the Central Board has covenanted to make to the company.

**The Puebla Tramway, Light & Power Co.,** in its report for 1930, states that the net revenues from operations in Mexico amounted to 1,704,418 Mexican pesos, as compared with 1,697,160 Mexican pesos in the preceding year. After charging expenses, interest, etc., there is a balance of $104,794 (Canadian). The net revenues were $806,361, to which is added other income making $820,573, and after deducting all charges a debit balance of $330,293 is carried forward.

**Imperial & International Communications, Ltd.,** reports that the estimated traffic receipts for October were £454,297, as compared with £446,097 in October, 1930. The receipts for the ten months ended October 31st were £3,960,544, as compared with £4,526,268 for the corresponding period of 1930, a decrease of £565,724. In comparing aggregates, allowance must be made for the changed conditions of sharing traffic.

**The Anglo-Argentine Tramways Co.** is unable to meet the half-year's interest on the 5 per cent. debentures, due on December 1st. A meeting of holders of the 5 per cent. debenture stock has therefore been called for November 30th at which the directors will submit a scheme for the suspension until December 1st, 1936, of interest and sinking fund payments.

**David Brown & Sons (Huddersfield), Ltd.,** report a profit for the year ended September 30th of £27,367 as against £87,160 in the preceding year. A dividend of 5 per cent., less tax (against 10 per cent., tax free) is recommended, leaving £118,000 (£117,287) to be carried forward.

**The Yorkshire (West Riding) Electric Tramways Co., Ltd.,** has announced a final dividend on the 6 per cent. cumulative preference shares of 3 per cent. No dividend has been paid on the ordinary shares since that for 1925.

**The Consolidated Gas, Electric Light & Power Co. of Baltimore** has declared a quarterly dividend of $0.90 per share on the common shares (same).

**The Great Northern Telegraph Co. (Ltd.), of Denmark,** has announced an interim dividend at the rate of 5 per cent. per annum, less tax (same).

**The Rushden and District Electric Supply Co., Ltd.,** is to issue 15,000 shares of £1 each to shareholders, in the proportion of one new share for every five held, at the price of 25s. per share.

# Stocks and Shares

TUESDAY EVENING.

STOCK Exchange members are fain to confess a feeling of disappointment at the failure of business activity in their markets to materialise, as it was expected to do, by reason of the anti-dumping legislation and the revival of trade which is taking place in various parts of the country. The nigger looming most darkly in the financial hedge at the present time is the fear of a collapse in German credit. This is exercising a heavy effect upon prices of British Government stocks, and, through them, of other securities connected more or less with the investment markets. At home, the approach of the end of the year is a reminder of the window-dressing propensities of those investors who prefer to stand well in their pass-books on New Year's Eve, and who refrain from buying stocks and shares at a season when they like to have money liquid. The action proposed by the Government in connection with the Anti-Dumping Act affects electrical as well as other industrial branches, but, so far, it has wrought no effect upon prices of stocks and shares in those companies connected with the business, the markets in which are under the influence of the depressing conditions touched upon above.

## Home Railway Stocks

Metropolitan ordinary stock has fallen 3 points to 42¼ after its recent substantial recovery. Districts are a point down at 6¼, and Underground Electric ordinary at 20s. show a shilling loss. The traffic returns of the trade lines indicate, up to the present, no reflection of the increased trade which, in the North, the Midlands and South Wales, is known to be stirring. Stockholders had expected that the dolorous recital of weekly traffic declines would have been turned, by now, into cheerful increases, but the latter have not yet appeared. In consequence of the weakness in gilt-edged securities, a number of the prior-charge stocks in the tube railway group have gone back to the extent of a point or so. London Electric 4 per cent. debenture at 78½ is 1 down, and various other stocks in this group are similarly easier. The London Traction group is somnolent, London & Suburban preference remaining at 9s. 3d., London United Tramway 5 per cent. debenture at 57½. An issue of £750,000 London General Omnibus Company 5 per cent. cumulative income debenture stock has come to market this week. The first selling price for the stock was 92¼ free of stamp, and a full six months' interest becomes payable on February 15th next. The existing stock, to which the new issue makes addition, has been a firm market for some time past at 95, and absorption of the new stock readily raised the price to 93.

## Cables and Wireless

Extremely vague rumours are current to the effect that a reduction of capital is contemplated by the Cables & Wireless

board. What truth there may be in the report it is impossible to say. At present, the issued amounts of the stocks are £20,762,000 7½ per cent. "A" ordinary stock, £8,700,000 "B" ordinary stock, and £23,215,000 5½ per cent. preference stock. Once again £100 of each class of stock can be bought for £100 cash, the prices this week showing declines ranging from 4 points to 5½. Disappointment is felt at the October traffic, which, although it shows an increase of £8,182, is by no means as good as many people have been looking for. The Great Northern Telegraph Company has declared its usual interim dividend of 2½ per cent. Anglo-American Telegraph preferred stock is a point higher at 96. Globe Telegraph and Trust ordinary shares fell to 10. The price still looks fully-valued, as it was suggested in last week's columns, when Globes stood 10s. higher. Marconi Marines hold their improvement at 36s. 3d. American Telephone & Telegraph at 177½ is 5 down, and Internationals at 19 show a drop of 3. Western Union Common shares have fallen to 75. Anglo-Portuguese ordinary are changing hands on the basis of 16s. 6d.

## Electricity Supply Shares

County of London ordinary are a shade easier at 45s.; otherwise no changes have occurred in the prices of the shares in the London Electricity Supply group. The debenture stocks of the electrical authorities hold their last week's improvement, notwithstanding the flatness that has befallen British Government securities. There is still stock on offer at prices that will give a return of a little over 5 per cent. to the investor. Midland Electric Power Corporation ordinary shares are better at 29s. 6d. There has been a good deal of business in the new shares issued by the Midland Counties Company. The details were given here last week. An active market has sprung up in the new shares, which were being offered at 24s. to existing proprietors in the proportion of one new share for nine old ordinary. The premium on the new shares is about a florin. The price of the old shares at 27s. is ex rights.

## Foreign Traction

The brightness which a fortnight ago illuminated Anglo-Argentine Tramway issues proved to be very transient, for the two classes of preference shares, which rose from 5s. to 15s., are back to 8s. 9d. each, and the 5 per cent. debenture at 12½ shows a drop of 10 points. The falls are due to the proposal that the company should declare a moratorium with regard to interest on the debenture stock. Other Argentine Traction issues are also flat. Buenos Ayres Lacroze 5 per cent. consolidated mortgage debentures have dropped to 30. The last time that stock is officially reported as having changed hands in the Stock Exchange was at 40, early in September. The price of the 5 per cent. debenture stock is nominally 60, and that of the 5 per cent. extension mortgage debenture 50. Brazilian Tractions have been moving in correspondence with the tendency amongst speculative shares in Wall Street, and at 14 the price shows a point fall on the week.

## Dollar Stocks

The recently issued report of the Power Corporation of Canada has had a slightly depressing effect upon the shares in this section. Those of the Corporation, which were down 2 points last week, are again lower at 39. Montreal Light and Power shares at 45 are 5 down, and Shawinigans at 36½ have shed 1½ points. Pennsylvanias hold their ground at 72½. The prices of Canadian-American industrials should benefit, automatically, by the fall that has occurred in the value of the £ as contrasted with that of the dollar, but so little is the support accorded to stocks and shares at the present time, both on this side of the Atlantic and in Wall Street and Montreal, that prices tend inevitably to sag.

## The Manufacturing Group

It had been hoped that the introduction of the Abnormal Importations (Customs Duties) Bill would serve to galvanise energy into the list of shares in companies connected with the electrical manufacturing and equipment industry. There has, indeed, been a fair amount of buying in Associated Electrical Industries and General Electrics. A good many thousand shares changed hands, but the selling proved to be as good as the buying, and the price on the week is unchanged at 23s. 9d. The support came mainly from the North and from New York. General Electrics are 1/16 lower at 45s. Rumour has again been linking the Telegraph Construction Company with some other undertaking that is supposed to be making a bid for it. No definite information has been forthcoming. Johnson and Phillips have weakened to 27s. Henleys are 3/16th down at 5½, British Insulated are 1/16 lower at 58s. 9d., and British Aluminiums at 28s. 9d., are 2s. 6d. down. Callender's Share & Investment Trust, which is controlled by Callender's Cable Co., reports an increased net revenue, and declares a 20 per cent. dividend on its shares. The 5 per cent. debenture stock is quoted at 102½. The ordinary shares are held privately. Amongst iron and steel shares, Babcocks have reacted to 51s. 3d., and Vickers are down to 9s., the general disposition in this market being towards lower levels. Amongst miscellaneous issues, Atlas ordinary have drooped to 11s. 9d., British Power & Light to 9s. 9d., Hall Telephone Accessories eased off to 17s. 3d. Business throughout most of the markets in the Stock Exchange is quiet, and no particular accession of activity is anticipated until the turn of the year.

# Share List of Electrical Companies

### HOME ELECTRICITY COMPANIES

| | Nom. | Approx. Dividend. 1929. | 1930. | Price, Nov. 24, 1931. | Rise or Fall. | Yield p.c. £ s. d. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole | | 15 | 15 | 58/9 | — | 5 2 3 |
| Brompton Ordinary | | 8½ | 8½ | 27/6 | — | 5 1 0 |
| Central Electricity 4½% Deb. | Stock | — | 4½ | 89 | — | 5 1 3 |
| Charing Cross Ordinary | 1 | 8½ | 8½ | 29/6 | — | 4 14 11 |
| Chelsea | 1 | 8½ | 8½ | 26/– | — | 5 7 8 |
| City of London | 1 | 10 | 10 | 35/– | — | 5 14 9 |
| Clyde Valley | 1 | 8 | 8 | 32/6 | — | 4 18 6 |
| County of London | 1 | 11 | 11 | 45/0 | –9d. | 4 17 9 |
| Edmundsons' 7% Pref. | 1 | 7 | 7 | 24/6 | — | 5 14 3 |
| Elec. Supply Corporation | 1 | 11 | 11 | 42/6 | — | 5 3 6 |
| Kensington Ordinary | 1 | 8 | 8 | 29/– | — | 4 16 7 |
| Lancs. Light and Power | 1 | 7 | 6½ | 25/– | — | 5 4 0 |
| London & Home Counties 4½% Deb. | Stock | — | — | 89 | — | 5 1 3 |
| London Electric | 1 | 8½ | 9 | 32/6 | - | 5 10 3 |
| Metropolitan | 1 | 9 | 10 | 40/9 | — | 4 18 0 |
| Midland Counties | 1 | 6½ | 7 | 27/0 | — | 5 3 3 |
| Mid. Elec. Power | 1 | 15 | 8 | 29/6 | +9d. | 5 8 6 |
| Newcastle-on-Tyne Ordinary | 1 | 8 | 6 | 24 6 | –6d. | 4 16 0 |
| Do. 7% Pref. | 1 | 7 | 7 | 26/– | — | 5 7 8 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 10½ | — | 5 14 3 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| St. James' and Pall Mall | 1 | 8 | 8 | 29/– | — | 4 16 7 |
| Scottish Power | 1 | 8 | 8 | 28/3 | — | 5 13 3 |
| South London | 1 | 8½ | 8½ | 25/6 | — | 5 9 3 |
| Urban Ordinary | 1 | 7 | 7 | 27/– | — | 5 3 3 |
| Westminster Ordinary | 1 | 8½ | 8½ | 28/– | — | 5 0 0 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 23/– | — | 6 10 5 |
| Yorkshire Elec. | 1 | 8 | 8 | 32/6 | — | 4 18 6 |

### HOME RAILS

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented | Stock | 4 | 4 | 70½ | — | 5 13 6 |
| Metropolitan | ,, | 4 | 3½ | 42½ | –3 | 8 4 3 |
| Do. District | ,, | 5 | 5 | 61½ | –1 | 8 2 3 |
| Underground Electric | 1 | 8 | 8 | 20/– | –6 | 8 0 0 |

### TELEGRAPHS AND TELEPHONES

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 96 | +1 | 6 5 0 |
| Do. Def. | ,, | 1½ | 1½ | 23 | — | 6 10 5 |
| Cables & Wireless 5½% Pref. | Stock | 5½ | 5½ | 50 | –5½ | — |
| Do. A 7½% Ord. | ,, | Nil | — | 22½ | –4½ | — |
| Do. B Ord. | ,, | Nil | — | 12 | –4 | — |
| Globe Tel. and T. Ord. | 10 | 10 | 8½ | 10 | –½ | — |
| Do. do. Pref. | 10 | 6 | 6 | 9 | –½ | 6 13 4 |
| Great Northern Tel. | 10 | 20 | 20 | 24½ | — | 8 3 4 |
| Marconi-Marine | 1 | 15 | 15 | 36/3 | — | 8 5 6 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 2½ | — | *5 13 0 |

### HOME AND FOREIGN TRAMS, ETC.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. | 5 | 5½ | — | 6 3 | –8/9 | — |
| Do. do. 2nd Pref. | 5 | 6 | — | 6 3 | –8/9 | — |
| Do. do. 5% Deb. | Stock | 5 | 5 | 12½ | –10 | — |
| British Electric Traction Def. Ord. | ,, | 5 | 5 | 875 | — | — |
| Do. do. Pref. Ord. | ,, | 8 | 8 | 122 | +5 | 6 11 2 |
| Brazil Traction | 100 | 8 | — | 14 | –1 | — |
| Brit. Columbia Elec. Rly. Pcs. | Stock | 5 | 5 | 90½ | — | 5 10 3 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 9 3 | — | — |
| London United Tram Deb. | Stock | 4 | 4 | 57½ | — | 6 19 2 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 27½ | — | 18 3 3 |
| Mexican Light Common | 100 | Nil | Nil | 25 | — | — |
| Do. 7% Pref. | 100 | 7 | 7 | 35 | — | 20 0 0 |
| Do. 1st Bonds | — | 5 | 5 | 62 | — | 8 1 4 |
| Victoria Falls Ord. | 1 | 15 | 15 | 58/9 | — | 5 2 3 |
| Yorkshire (West Riding) | 1 | Nil | Nil | 6/3 | — | — |

### MANUFACTURING COMPANIES

| | | | | | | |
|---|---|---|---|---|---|---|
| Assoc. Elec. Ord. | 1 | 6 | 6 | 23/9 | — | 5 1 1 |
| Do. Pref. | 1 | 8 | 8 | 27/6 | — | 5 16 5 |
| Babcock & Wilcox | 1 | 15 | 14 | 51/3 | –¼ | *5 9 4 |
| British Aluminium Ord. | 1 | 10 | 10 | 28/9 | –½ | 6 19 2 |
| British Insulated Ord. | 1 | 15 | 15 | 2½ | –¼ | 5 2 3 |
| Brush Ord. | Stock | 10 | 5 | 75 | — | 6 13 4 |
| Callender's | 1 | 15 | 15 | 2½ | — | 5 2 3 |
| Do. 6½% Pref. | 1 | 6½ | 6½ | 23/9 | — | 5 9 5 |
| Crompton Parkinson Ord. | 5/– | 30 | 30 | 22/6 | — | 6 13 4 |
| Do. 8% Pref. | 1 | 8 | 8 | 28/3 | — | 5 13 3 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 23/3 | — | 6 9 6 |
| Do. 5% Deb. | Stock | 5 | 5 | 91½ | — | 5 9 3 |
| Electric Construction | 1 | 5 | Nil | 12/6 | — | — |
| Enfield Cable Ord. | 1 | 25 | 25 | 4½ | — | 5 17 8 |
| English Electric | 1 | Nil | Nil | 10/– | — | — |
| Do. do. Pref. | 1 | Nil | Nil | 8/9 | — | — |
| Ferranti Pref. | 1 | 7 | 7 | 21/3 | — | 6 11 9 |
| G.E.C. Pref. | 1 | 6½ | 6½ | 24/6 | — | 5 6 1 |
| Do. Ord. | 1 | 14 | 10 | 45/– | –¼ | 4 9 0 |
| Henley's | 1 | 30 | 30 | 5½ | –¼ | 5 9 1 |
| Do. 4½% Pref. | 5 | 4½ | 4½ | 4½ | — | 5 6 9 |
| India-Rubber | 1 | Nil | Nil | 6/3 | –6 | — |
| Johnson & Phillips | 1 | 10 | 10 | 27/– | –1/9 | 7 4 1 |
| Siemens Ord. | 1 | 7½ | 7½ | 23/3xd | — | 6 9 0 |
| Telegraph Construction | 12 | 10 | 7½ | 18 | — | 6 18 6 |

* Dividends paid free of Income Tax.

# Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed are abridged and all subsequent proceedings will be taken.

**1930.**

12,580. "High-frequency coupling system for thermionic amplifiers." Hazeltine Corp. June 20th, 1929. (359,890.)

12,710. "Thermo-electric method of controlling the action of electro-magnets." E. A. Kulikowsky. April 24th, 1930. (359,891.)

15,492. "Dynamo-electric machines." British Thomson-Houston Co., Ltd. May 20th, 1929. (359,988.)

16,521. "Process for making carbon electrodes for electric furnaces." Siemens-Planiawerke Akt.-Ges. für Kohlfabrikate. November 23rd, 1929. (359,990.)

16,995. "Electric measuring apparatus." E. Reich. June 2nd, 1930. (359,992.)

18,569. "Electric synchronising apparatus." J. H. O. Harries. June 18th, 1930. (359,947.)

18,895. "A.c. electricity meters." F. Holden and Measurement, Ltd. June 20th, 1930. (359,948.)

19,582. "Illuminated signs for advertisement, traffic guidance, and like purposes." G. R. Croxford. June 27th, 1930. (360,000.)

19,822. "Positive column discharge tubes." A. E. White (Flexlume Corp.). June 30th, 1930. (359,965.)

22,067. "Electric propulsion of ships." Akt.-Ges. Brown, Boveri et Cie. August 10th, 1929. (359,951.)

22,190. "Electric insulators." W. W. Triggs (Ohio Brass Co.). July 23rd, 1930. (359,966.)

22,233. "Three-phase current meters." Siemens-Schuckertwerke Akt.-Ges. October 22nd, 1929. (359,898.)

22,353. "Device for examining electric sparks of internal-combustion motors." P. Stchepotieff. July 24th, 1930. (359,930.)

22,394. "Process of manufacturing electric telephone cables." Felten et Guilleaume Fabrik Elektrischer Kabel Stahl und Kupferwerke Akt.-Ges. September 21st, 1929. (Addition to 330,731.) (360,007.)

22,463. "High-resistance conductors." W. P. Luthy. July 25th, 1930. (359,932.)

22,504. "Telegraph exchange systems." Automatic Telephone Manufacturing Co., Ltd., and H. H. Harrison. July 25th, 1930. (360,009.)

22,512. "Radio-electric musical instrument with keyboard and thermionic valves." E. E. Coupleux and J. A. M. V. de P. Giveler July 26th, 1929. (359,967.)

22,529. "Magnetic cores for coils and the like." Callender's Cable & Construction Co., Ltd., S. Beckinsale, and H. J. Allcock July 25th, 1930. (359,933.)

22,638. "Non-metallic electrical resistance bodies." R. Bosch Akt.-Ges. August 3rd, 1929. (360,013.)

22,795. "Time switch." Landis & Gyr Soc. Anon. August 2nd, 1929. (359,969.)

22,979. "Regulation of electric generators." P. C. Saccaggio. July 30th, 1930. (359,980.)

23,010. "Television and like apparatus." J. L. Baird and Television, Ltd. (in liquidation). July 30th, 1930. (359,981.)

23,024. "Mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and J. C. Read. July 30th, 1930. (359,982.)

23,153. "Leakage transformers with linear adjustment of intensity." J. Brettmon. July 31st, 1930. (360,029.)

23,217. "Electron-discharge devices." Standard Telephones and Cables, Ltd., and L. H. Bedford. August 1st, 1930. (360,036.)

23,417. "Sealing of electric cables in metal-clad switchgear or like electrical apparatus." A. Reyrolle & Co., Ltd., and J. Christie. August 5th, 1930. (360,055.)

23,437. "Electric protective systems." A. Reyrolle & Co., Ltd., and T. S. Andrew. August 5th, 1930. (360,057.)

23,456. "Supporting of electrical insulators." British Thomson-Houston Co., Ltd., A. A. Pollock, and W. S. Adams. August 5th, 1930. (360,059.)

23,457. "Electric motors." G. Kent, Ltd., and A. H. Avery. August 5th, 1930. (360,060.)

23,559. "High-frequency oscillators." H. E. Hollmann. August 13th, 1929. (360,063.)

23,590. "Electric time relays." International General Electric Co., Inc. August 6th, 1929. (360,064.)

23,731. "Electric storage battery using lead suboxide as the material of the paste." K. Yamaoka. August 7th, 1930. (360,071.)

23,780. "Electrically-operated unit for imparting intermittent percussion or reciprocatory movements." H. D. Jones. August 8th, 1930. (360,073.)

23,975. "Electric pocket-lamp." B. D. Lifschitz. August 11th, 1930. (360,080.)

24,090. "Telephone construction." Siemens Bros. & Co., Ltd., and W. E. Goodwin. August 12th, 1930. (360,084.)

24,450. "Electric power transmission by means of underground cables." Economic Transmissions, Ltd., and A. M. Taylor. August 15th, 1930. (Cognate application 16,963/31.) (360,090.)

25,916. "Means for controlling generation in electrically propelled vehicles." W. A. Stevens and Guy Motors, Ltd. August 30th, 1930. (Cognate applications 30,445/30, 766/31, and 6,293/31.) (360,099.)

26,594. "Thermionic valve systems employing ganged tuning-condensers." Gramophone Co., Ltd., and D. W. Pugh. September 5th, 1930. (360,107.)

28,485. "Electromagnetic stepping switches." Siemens Bros. & Co., Ltd., and D. A. Christian. September 23rd, 1930. (360,130.)

32,111. "Dynamometer apparatus for testing internal combustion engines." F. W. W. Highfield and Highfield Electrical Co., Ltd. October 25th, 1930. (360,178.)

34,209. "Spool bodies for electrical apparatus." British Thomson-Houston Co., Ltd. November 14th, 1929. (360,202.)

35,978. "Electric stop-motions for drawing-frames for wool, worsted and like fibres." W. J. Scott. November 30th, 1929. (360,224.)

35,691. "Dynamo-electric machines." Westinghouse Electric & Manufacturing Co. December 17th, 1929. (360,233.)

26,915. "Mounting or supporting of electric motors for vacuum cleaners or the like." W. Mauz, P. Pfeiffer, E. Faber, and L. Hahn (trading as Mauz & Pfeiffer). December 16th, 1929. (360,235.)

37,414. "Electric junction and distributing boxes of the disconnecting type." Siemens Bros. & Co., Ltd., and C. E. Rose. December 11th, 1930. (360,241.)

**1931**

78. "Picture and the like telegraph systems and television systems." Telefunken Ges. für Drahtlose Telegraphie. January 4th, 1930. (360,263.)

3,327. "Rectifier system for feeding electric arc furnaces from alternating current." Akt.-Ges. Brown, Boveri et Cie. February 1st, 1930. (360,288.)

3,345. "Heterodyne systems suitable for use in wireless reception." Marconi's Wireless Telegraph Co., Ltd. January 31st, 1930. (360,289.)

4,046. "Electric switch contacts." British Thomson-Houston Co., Ltd. February 7th, 1930. (360,294.)

4,159. "Luminous electric discharge tubes." General Electric Co., Ltd. February 18th, 1930. (360,296.)

5,297. "Radio and like high-frequency receivers." Marconi's Wireless Telegraph Co., Ltd. February 19th, 1930. (360,305.)

6,469. "Impulse transmitters for use in telephone or like systems." Telephon-Apparat-Fabrik E. Zwietusch & Co., Ges. July 7th, 1930. (359,852.)

7,107. "Electric switches." Sachsenwerk Licht-und Kraft Akt.-Ges. April 19th, 1930. (359,855.)

10,463. "Electromagnetic clutches." H. E. Hodgson. April 9th, 1930. (360,336.)

11,406. "Mercury-vapour rectifiers." Akt.-Ges. Brown, Boveri et Cie. April 26th, 1930. (360,342.)

11,407. "Transmission of electrical energy between alternating and direct current networks." Akt.-Ges. Brown, Boveri et Cie. April 28th, 1930. (360,343.)

11,471. "Electric lamps." General Electric Co., Ltd. May 16th, 1930. (360,344.)

12,416. "Electric driving means for machine tools." F. Werner Akt.-Ges. and C. Junge. April 27th, 1931. (360,347.)

14,038. "Vacuum-tube signs." R. Macey. May 12th, 1931. (360,350.)

21,018. "Illuminated signs for traffic guidance and like purposes." G. R. Croxford. June 27th, 1930. (Divided application on 19,582/30.) (360,048.)

21,019. "Illuminated signs for advertisement traffic guidance and like purposes." G. R. Croxford. June 27th, 1930. (Divided application on 19,582/30.) (360,049.)

25,349. "High-frequency coupling system for thermionic amplifiers." Hazeltine Corp. June 20th, 1929. (Divided application on 12,580/30.) (359,571.)

26,706. "Devices for electrically recording gramophone records." A. E. Bawtree. July 22nd, 1930. (Divided application on 359,532.) (359,573.)

# Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 18th :—

Aerovox. No. 519,381. Class 8. Sound reproducing apparatus, and apparatus for use in radio-telegraphy and telephony.—Aerovox Wireless Corporation, Brooklyn, N.Y. (British representatives: White, Langner, Stevens, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.1.)

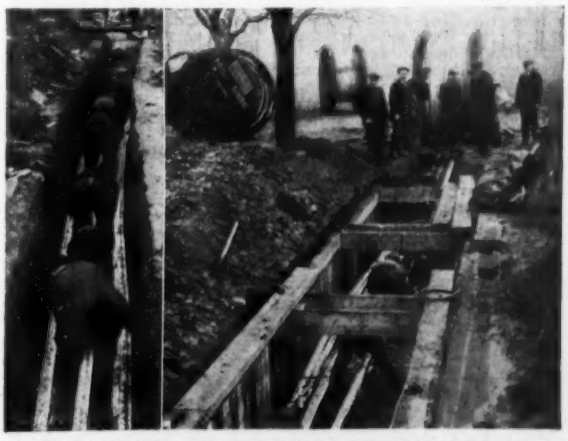
Ideal Blaupunkt (lettering and design). No. 526,221, and Ideal Point Bleu (lettering and design). No. 526,222. Class 8. Loud speakers, loud speaker units, and gramophone pickups.—British Blue Spot Co., Ltd., 94-96, Rosoman Street, Rosebery Avenue, E.C.

Cabaret. No. 526,390. Class 8. Radio-telegraphic and telephonic apparatus, sound-reproducing apparatus, radio apparatus in combination with gramophones and parts thereof.—"Slektun" Products, Ltd., 21, Douglas Street, S.W.1.

Posterlume. No. 526,254. Class 8. Electric signs.—Walton Harvey, 147, Fleet Street, E.C.4.

WattSense (lettering and design). No. 524,040. Class 13. Electric lamps (ordinary).—C. Ross, trading as the Palace Lamp Co., 31, School Lane, Liverpool.

Asbestolite. No. 526,011. Class 50. Electrical insulating materials.—Micanite & Insulators, Ltd., Blackhorse Lane, Walthamstow.



**A section of 132-kV cable being laid on Clapham Common for the Grid connection between Battersea and Wimbledon**

# New Work for Contractors

## Particulars of new works and building schemes for the use of electrical installation contractors and traders

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

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**Arbroath.**—Auction hall and showrooms for D. T. Wilson & Sons, 99-103, High Street; the manager.

**Birkenhead.**—Extensions, General Hospital, including night casualty department; secretary.

**Birmingham.**—Shop premises at the corner of Gospel Lane and Lakey Lane, Acocks Green; P. H. Perks Bros., builders, Acocks Green.

**Blaydon-on-Tyne.**—Houses (50), Highfield, for the U.D.C.; Mr. Mastaglio, surveyor, Council Offices.

**Bolton.**—Church, Tong Moor, for the Congregational Trustees; Bradshaw, Gass & Hope, architects, 19, Silverwell Street.

**Boston** (LINCS).—Houses (93) for the R.D.C.; surveyor.

**Bournemouth.**—Development of Sunnymoor estate; Claypott, Dowden & Hawkins. Motor showrooms and offices, St. Cuthbert's site, Christchurch Road; MacKenzie & Phillips. Shops at Junction of Christchurch Road and Hambledon Road; E. de Wilde Holding.

**Buckinghamshire.**—Two schools, Slough (£36,910), for the county E.C.; director of education, Aylesbury.

**Burton-on-Trent.**—Bazaar premises, High Street, for Marks & Spencer, Ltd., London.

**Carlisle.**—Church, Ragglis; Rev. H. B. Wilson, vicar, St. Cuthbert's Church.

**Chester-le-Street.**—Houses (136), Fatfield, for the R.D.C.; surveyor, Council Offices.

**Colchester.**—Improvements to poor law institution (£2,125); county architect.

**Coleshill.**—Extensions to St. Paul's R.C. School; managers.

**Coulsdon** (SURREY).—Development of Chalden Way estate; C. H. Cearn.

**Cramlington** (NORTHUMBERLAND).—Housing scheme for the U.D.C.; surveyor.

**Croydon.**—Houses (45), Bennets Way; R. T. Grove, "Lincluden," Beaumont Road, S.W.19. Houses (50), Grange Road; Smith & Co., 36, Winterborne Road. Rehousing Old Town area (£51,000); borough engineer. Reconstruction of premises, Cherry Orchard Road; Peark's Dairies, Ltd. Showrooms, London Road and Bensham Road; Batchelor (Kennards), Ltd.

**Dagenham.**—Houses (1,900), Rylands estate; R. Costain & Sons, Ltd.

**Darton** (YORKS).—Houses, Staincross (34) and Higham (26); J. Gibson, clerk to the Council, Union Bank Chambers, Royal Street, Barnsley.

**Dorset.**—Extensions, Herrison Mental Hospital, Dorchester, for the C.C.; county architect, Dorchester.

**Dover.**—Rebuilding business premises, High Street, for Turnpenny Bros., Ltd.

**Dunston-on-Tyne** (DURHAM).—Houses (60) for the Whickham U.D.C.; Shields Bros., builders, Swalwell, Newcastle.

**Eastbourne.**—Houses (128), Corporation Road site; borough engineer.

**Edinburgh.**—Church at Davidson's Mains (£9,500); Rev. D. Paterson, convener of Home Mission Committee, Edinburgh Presbytery. Science laboratory, etc., at Streatham House; the Right Rev. F. W. Knowles, Fort Augustus.

**Essex.**—Junior school, Leigh Beck, Canvey (£5,500); new premises for Ilford High School for Boys (£52,648); and extensions to Brentwood Mental Hospital (£61,500), for the C.C.; J. Stuart, county architect, Chelmsford.

**Falmouth.**—Houses (34), Penwerris, for the T.C.; H. E. Tressider, borough surveyor.

**Fifeshire.**—Houses (112) for Buckhaven T.C.; burgh surveyor.

**Frome** (SOMERSET).—C. of E. School; A. J. Pictor, architect, Abbey Chambers, Bath.

**Gateshead-on-Tyne.**—R.C. school, Dryden Road, Low Fell; Stienlet & Maxwell, architects, 5, Saville Chambers, Newcastle.

**Glasgow.**—Improvements to the Robroyston Hospital, Millerston, Bishopbriggs; J. Livingstone, builders, 108, West Regent Street. School clinic for the Corporation Health Department; city architect. School (14 classrooms), Springburn; master of works, Education Committee, Bath Street.

**Gosport.**—Extensions, Alverstoke National Children's Home and Orphanage (£25,000); secretary.

**Hampshire.**—Schools, Basingstoke, Crookham, and Lymington, for the county E.C.

**Hanford** (STAFFS).—Building estate, Stone Road; A. Rawlins.

**Hendon.**—Houses (26), Glede estate, Great Stanmore, for the R.D.C.; H. W. Rackham, Council surveyor.

**Hertfordshire.**—School, Mill End, Rickmansworth, for the county E.C.; county surveyor, Hatfield.

**Huyton-with-Roby.**—Houses and shops (1,460), Page Moss estate; U.D.C. surveyor.

**Irish Free State.**—(BALLINA, CO. MAYO).—Houses (35), for the U.D.C.; town surveyor, Knox Street. (DUN LAOGHAIRE, CO. DUBLIN).—Houses (56), Kill Avenue; P. J. Hernon, town clerk, Town Hall.

**Lancashire.**—Schools, Darwen and Whitefield, and alterations and additions to the Technical College, Widnes; director of education, County Offices, Preston.

**Leeds.**—Alterations to People's Palace, Meadow Road; Atlas Picture House, Kirkstall Road; Crown Cinema, Tong Road; and Paramount Theatre, The Headrow; licensees. Post Office garage, Water Lane; H.M. Office of Works, Britannia House, Wellington Street.

**Leicester.**—Clearance of Abbey Street area; city engineer. Infants' school, Imperial Avenue (£13,240); city architect.

**Leicestershire.**—Central school, Markfield, for the county E.C.

**Liverpool.**—Reconstruction and enlargement of works, for Milner's Safe Co., Ltd.

**London.**—(POPLAR).—Factory, Gunmakers Lane; Factory Bdgs. & General Structures, Ltd. (WANDSWORTH).—Three blocks of flats at Garratt Lane, for the B.C. (£30,400); E. Clark, & Sons, contractors, Melton Mowbray. (WOOLWICH).—Public baths, Eltham, for the T.C.; borough surveyor.

**Luton** (BEDS).—Reinstatement of hat factory, 12, Melson Street, for J. Aron & Co.

**Maidstone.**—Fruit and vegetable canning factory; Baird-Wolton & Co., Ltd.; S. May, Gallants Farm, East Farleigh.

**Manchester.**—Reconstruction of premises, Longley Road, Pendleton, for Chappell Brothers, Ltd., London; A. Scott, resident architect.

**Newbury** (BUCKS).—Junior school; borough engineer.

**Newcastle-on-Tyne.**—Houses (340) at Scotswood, for the C.C.; R. E. Roberts, housing architect, Town Hall. Rebuilding of the "Marlborough Hotel"; J. Simpson & Co., builders, Northumberland Street. Alterations to the Town Hall (£75,000) for the T.C.

**Northern Ireland.**—(BELFAST).—School, St. John's Falls Road, for the B.C.; H. Lamont & J. J. Brennan, architects, 83, Royal Avenue. (DUNDONALD, BELFAST).—Electric lighting installation at St. Elizabeth's Church; Rev. J. B. Cotter, rector.

**North Shields.**—Primitive Methodist church, Hawkeys Lane (£10,000); W. H. Browse, builder, Church Way.

**Nuneaton.**—Extension of General Hospital (£3,000); Committee of Management.

**Ormskirk.**—Sewage disposal works, with pumping station; H. B. Ward, consulting engineer, 26, North John Street, Liverpool.

**Pontefract.**—Houses (50), Brotherton, for the R.D.C.; Tennant & Smith, architects, Ropergate.

**Portland.**—Houses, Council estate (£7,110); Jesty & Baker.

**Preston.**—Two kinemas near India Mill, New Hall Lane, and Ribbleton Avenue and Blackpool Road; borough engineer.

**Repton** (DERBYSHIRE).—Houses, Hatton, Coton-in-the-Elms and Rosliston (£14,415), for the R.D.C.; surveyor.

**Romford** (ESSEX).—Kitchen improvements, with refrigeration plant, Romford Institution; county architect.

**Sale** (CHESHIRE).—Additions to Sale and District War Memorial Hospital, Charlton Drive; Matley, Brotherton & Mills, 11a, Old Millgate, Manchester.

**Sanderstead.**—Development of Purley Downs estate; Thomas & Son.

**Sheffield.**—Telephone exchange, Ranmoor; H.M. Office of Works, King Charles Street, S.W.1.

**Southport.**—Opera house, Lord Street (£120,000); G. E. Tonge, architect.

**South Shields.**—Bakery, Back Brodrick Street, for W. H. Parker; and offices, Alexander Street, for Hanlons, Ltd.; H. Hill, architect, 10, Winchester Street. Five shops, South Avenue; J. H. Morton & Sons, architects, Bank Chambers, Fowler Street.

**Stamford Hill.**—Telephone exchange; H.M. Office of Works, King Charles Street, S.W.1.

**Stockton-on-Tees.**—Omnibus garage, Boathouse Lane, for the T.C.; J. P. Wakeford, architect, Town Hall.

**Sunderland.**—Houses (100) for the R.D.C.; surveyor, Council Offices.

**Surrey.**—Special subjects' centre, Barnes, for the county E.C.; W. W. Finny, secretary, Kingston-on-Thames.

**Swanscombe** (KENT).—Houses, Rectory Field; U.D.C. surveyor.

**Tamworth.**—Houses (164), Bolehall estate, for the B.C.; A. O. Marshall, borough engineer, Municipal Offices.

**Thanet** (KENT).—Extensions to casual wards (£4,500); county architect, Maidstone.

**Tunstall.**—Housing scheme; Stoke-on-Trent, city engineer.

**Tynemouth.**—Extensive alterations to the "Grand Hotel"; Marshall & Tweedy, architects, 129, Pilgrim Street, Newcastle-on-Tyne.

**Wallingford.**—Factory and garage, St. John's Road; Co-operative Wholesale Society.

**Washington** (DURHAM).—Houses (150), Heworth Road site, for the U.D.C.; R. J. Swaddle, surveyor.

**Windsor.**—Rebuilding business stores, High Street and Peascod Street, for Montague Burton, Ltd., Leeds.

**Speed reduction in a tweed mill (belt and chain gear)—driving motor inset** (*See p.* 806)